AMMI Canada

Association of Medical Microbiology and Infectious Disease Canada

l'Association pour la microbiologie médicale et l'infectiologie Canada

From Evidence to Action: Initial Launch of the Canadian Antibiotic Treatment Guidance

Thursday, November 13, 2025

1:00 – 2:00 Eastern

Firstline®

Financial contribution:
Contribution financière :

Public Health Agency of Canada | Agence de la santé publique du Canada

Land Acknowledgement

We recognize that our work and the work of our members take place on the traditional Indigenous territories across Canada.

We wish to acknowledge that the headquarter office of the AMMI Canada secretariat is located on the traditional and unceded territory of the Algonquin Anishinaabeg People. We also recognize that the participants attending this session are located in other traditional lands across Canada.

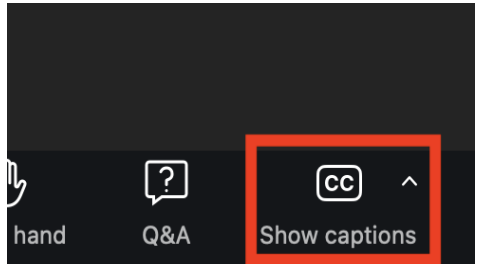
Today, this meeting place is still the home to many First Nations, Inuit and Métis peoples from across Turtle Island and we are grateful to have the opportunity to work and to play and to grow on this territory. By personally making a land acknowledgement you are taking part in an act of reconciliation, honouring the land and the Indigenous heritage.

Webinar Housekeeping Notes

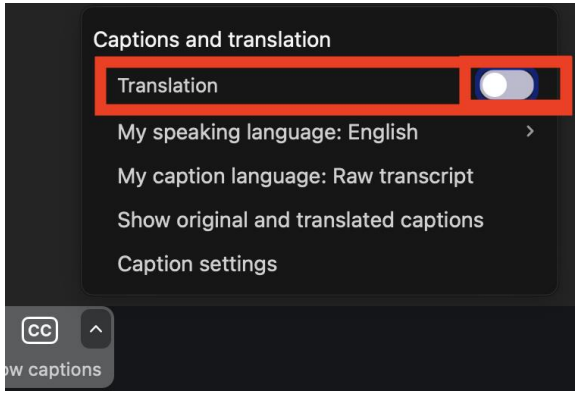
AMMI Canada

This webinar will be conducted in English. Translated Closed Caption is available in multiple languages.

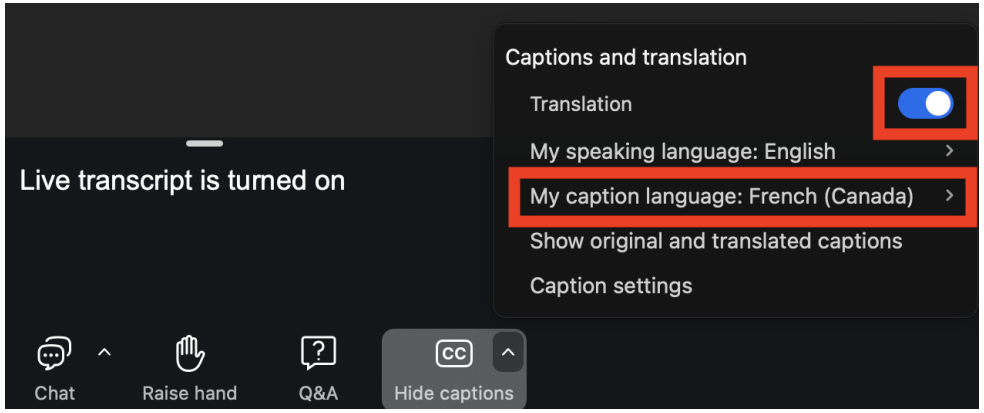
Step 1: Click the up arrow beside the CC button



Step 2: Turn on the Translation Toggle



Step 3: Once the toggle is blue select the "MY CAPTION Language" and select your preferred language from the list.



Webinar Housekeeping Notes

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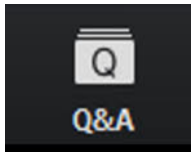
Questions: If you have a question for our presenters, please use the Q&A feature.



Questions will be answered live following the presentation (please note we cannot guarantee that all questions will be answered)

Please note the Chat Box has been disabled. If you are experiencing technical difficulties, please email krystal@ammi.ca.

Moderator and Presenters

Moderator:

Kanchana Amaratunga, MD, MPH, FRCPC
Infectious Diseases/Public Health Medical Advisor
Public Health Agency of Canada

Presenters:

Deborah Yamamura, BSc, MD, FRCPC
Chair, AMMI Canada Guideline Development Panel
Professor, Department of Pathology and Molecular Medicine
McMaster University, Hamilton, ON

Dena Zeraatkar, MSc, PhD
Co-Chair/Senior Methodologist, AMMI Canada Guideline Development Panel
McMaster University, Hamilton, ON

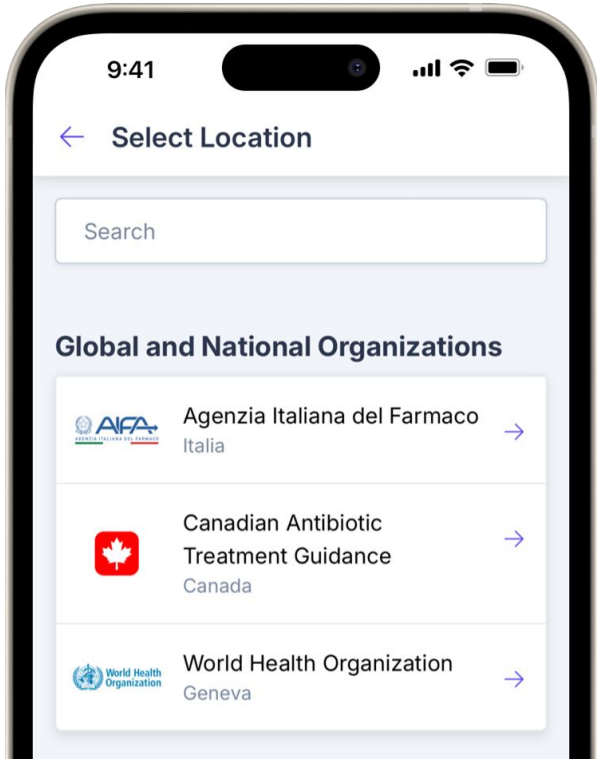
Michael Long, PhD
Chief Clinical Officer
Firstline

Objectives

By the end of this webinar participants will be able to:

- Understand the current antibiotic resistance (AMR) situation in Canada and worldwide
- Review the WHO Essential Medicines List and Antibiotic Handbook
- Gain a clear overview of the goals and methods behind the Canadian Antibiotic Treatment Guidance, including how the evidence was reviewed and adapted.
- Navigate and use the Firstline platform to access and integrate the guidance into point-of-care decision-making.
- See how the guidance applies to real cases such as: Acute pharyngitis and Community Acquired Pneumonia.
- Learn what is coming next for this national initiative.

Download Firstline



Scan the QR Code to Download Firstline

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1. Open Firstline app
2. Tap "Select Location"
3. Select "Canadian Antibiotic Treatment Guidance"
4. Select Language

Antimicrobial Resistance

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WHO warns of widespread resistance to common antibiotics worldwide

13 October 2025 | News release | Geneva |Reading time: 3 min (689 words)

THE GLOBE AND MAIL

Over 3 million children died from AMR-related infections in 2022, major study shows

PR Newswire - Sat Apr 12, 5:01PM CDT

Antimicrobial Resistance

United Nations

- AMR is one of the most urgent global health threats
- Projected that could result in US $1 trillion in additional health costs by 2050
- Goal to decrease deaths associated with AMR by 10% by 2030

Canadian Antimicrobial Resistance Surveillance System (2022, 2025-soon to be released)

- 2022 AMR continued to increase for most priority organisms

Question

What are the top three AMR priority pathogens in Canada?

1) Carbapenemase producing Enterobacterales, MRSA, VRE
2) ESBL producing Enterobacterales, carbapenemase producing P. *aeruginosa*, Drug resistant *Salmonella* spp
3) Carbapenemase producing Enterobacterales, Drug-resistant *N. gonorrhoeae*, Carbapenem producing *Pseudomonas aeruginosa*
4) Drug-resistant *N. gonorrhoeae*, *Candida auris*, Drug-resistant influenza A

Canadian 2025 AMR Priority Pathogens

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Table 1. Canada's AMR Pathogen Threats (2025): Pathogens by Priority Group Based on total Weighted Risk Scores out of 100 (n=29).

Tier 1: High priority group (80–100th percentile)	Tier 2: Medium-high priority group (60 to <80th percentile)	Tier 3: Medium-low priority group (40 to <60th percentile)	Tier 4: Low priority group (<40th percentile)
Carbapenem-resistant Enterobacterales (97)	Drug-resistant *Shigella* spp. (70)	Clindamycin-resistant Invasive Group A *Streptococcus* (61)	Drug-resistant *Haemophilus influenzae* (58)
Drug-resistant *Neisseria gonorrhoeae* (92)	*Mycoplasma genitalium* (70)	Drug-resistant Influenza A (61)	Drug-resistant *Helicobacter pylori* (58)
Carbapenem-resistant *Pseudomonas aeruginosa* (84)	Drug-resistant *Streptococcus pneumoniae* (65)	Drug-resistant Human immunodeficiency virus (59)	Drug -resistant *Candida* spp., excluding *Candida auris* (57)
Carbapenem-resistant *Acinetobacter spp.* (83)	Methicillin-Resistant *Staphylococcus aureus* (63)	Drug-resistant Group B *Streptococcus* (59)	Drug-resistant *Campylobacter* spp. (56)
Candida auris (75)	Vancomycin-resistant *Enterococcus* spp. (62)	*Clostridioides difficile* (59)	Drug-resistant *Bacteroides* spp. (55)
Extended spectrum B-lactamase-producing Enterobacterales (71)	Drug-resistant *Salmonella* spp. (Non-typhoidal) (62)	Multi-drug resistant *Mycobacterium tuberculosis* (59)	*Ureaplasma* spp. (53)
		Drug-resistant *Aspergillus* spp. (59)	Drug-resistant *Treponema pallidum* (53)
		Drug-resistant *Salmonella* spp. (Typhoidal) (59)	Drug-resistant *Chlamydia trachomatis* (46)
			Drug-resistant Pulmonary non-tuberculosis *Mycobacteria* (45)

Abdesselam K et al. PLOS One Sept 2025

Canadian Antibiotic Usage

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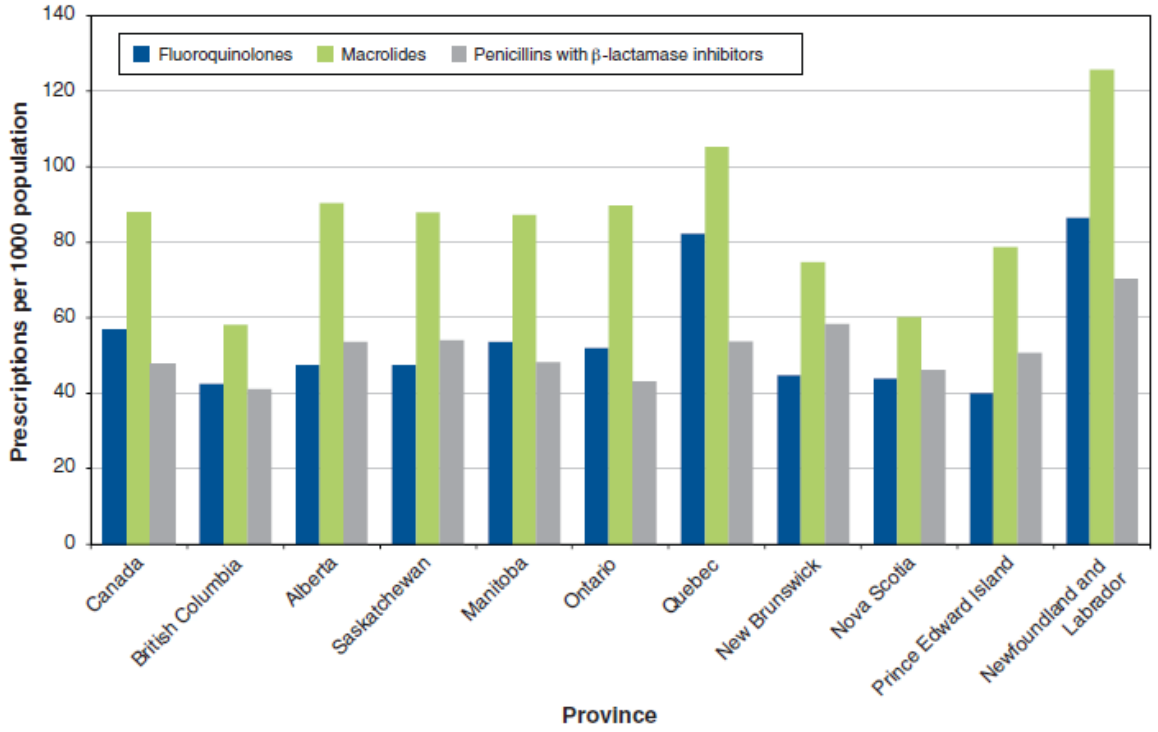
Prescriptions from the IQVIA Geographic Prescription Monitor database (2019)

- 75% of total prescriptions
- 14 classes of oral Abx were monitored
- 627.3 prescriptions per 1000 population
  - Newfoundland/Labrador: 920.5
  - British Columbia: 543.3



CMAJ Open 2022 March 22

WHO Essential Medicines List

ACCESS

Activity against a range of pathogens
Lower resistance potential than other Abx
1st and 2nd choice for empiric treatment for common infections
Should be widely available

WATCH

Relatively high risk of selection of bacterial resistance. Potential higher toxicity.
Some are 1st and 2nd line choice for empiric treatment for limited number of syndromes

RESERVE

Last resort ABx
Reserved for treatment of confirmed or suspected infections due to MDR organisms

Canadian Expert Panel is updating the AWaRe classification for Canada

Stewardship Targets:

WHO 13th General Program: 60% ACCESS antibiotic use

United Nations Declaration on AMR 2024 (endorsed by Canada):

- Ensure, by 2030, that the use of WHO Access group antibiotics is expanded from the 2023 global target, and in that regard, taking into account national contexts, aim to achieve at least **70 per cent** overall human antibiotic use globally, through investing in and strengthening stewardship programmes

AWaRe Abx and Resistance

- Significant association between almost all Abx and colonization/infection with MDRO
- Higher OR for Abx in the Watch or Reserve compared to Access
- Highest association with linezolid and carbapenems and MDRO
- Lowest association with 1st generation cephalosporins
- Use of any Abx significantly associated with ESBL-Enterobacterales
- Limitations: mainly case-control, majority of studies were inpatients, all were adult, duration was not available

Clin Microbiol Infection 2022 1193-1202

Canada's Antibiotic Usage

- In a global review of Abx consumption (2000-2015), Canada was just below the 60% ACCESS target
- Prescribing decreased 2019-2021 but has increased by 24% 2020-2024
- 70% of Abx are from the Access Category (community)
  - UTI 2021 data:
    - ACCESS: nitro (42%), TMP-SMX (13%)
    - WATCH: ciprofloxacin (13%), cefixime (5%)
    - Unclassified: Fosfo oral (10%)
    - Decrease in Amoxil (ACCESS) from 11 to 5%
- In the hospital:
  - Overall 25% inappropriate or suboptimal (NAPS)
    - By category: surgical prophylaxis 12.3%, UTI 10.7%, CAP 9.3%s
  - 44% ACCESS, 55% WATCH and 1% RESERVE (18% inappropriate)

CARSS, CPCSSN
Klein et al Lancet 2021 21:107

WHO Antibiotic Handbook

- Goal to optimize the quality of global antibiotic prescribing including for LMIC countries
- Evidence based approach to provide recommendations of 1st and 2nd line agents linked to the WHO EML
- Also includes guidance on clinical features, diagnostics

WHO's essential medicines and AWaRe: recommendations on first- and second-choice antibiotics for empiric treatment of clinical infections

Lorenzo Moja [1,*], Veronica Zanichelli [1], Dominik Mertz [2,3,4], Sumanth Gandra [5], Bernadette Cappello [1], Graham S. Cooke [6], Pem Chuki [7], Stephan Harbarth [8,9], Celine Pulcini [10], Marc Mendelson [11], Evelina Tacconelli [12], Loice Achieng Ombajo [13,14], Ronald Chitatanga [15], Mei Zeng [16], Monica Imi [17], Christelle Elias [18,19], Per Ashorn [20], Annamaria Marata [21], Sarah Paulin [22], Arno Muller [22], Awa Aidara-Kane [23], Teodora Elvira Wi [24], Wilson Milton Were [25], Elizabeth Tayler [26], Albert Figueras [27], Carmem Pessoa Da Silva [22,28], Catharina Van Weezenbeek [22], Nicola Magrini [29,30], Mike Sharland [31], Benedikt Huttner [1], Mark Loeb [2,3,4]

L. Moja et al. / Clinical Microbiology and Infection 30 (2024) S1–S51

Pan-Canadian Action Plan

Priority actions:

- Develop, implement and promote guidelines/standards for appropriate AMU in humans and animals through policy and regulatory initiatives, monitoring and educational interventions/accreditation requirements for health professionals and prescribers.
- Foster understanding of the risks of AMR and the importance of appropriate use of antimicrobials in humans and animals amongst the public, patients and producers through awareness/education campaigns, feedback mechanisms and policy and regulatory initiatives.

Development of a for Canada, National Prescribing Guidelines is a key component of the PCAP

Canadian Antibiotic Treatment Guidance

- Updated 2025 empiric treatment recommendations based on a robust methodological framework evaluating the most current systematic reviews and meta-analysis and recent guidelines using a Grade Adolopment Methodology applied to the WHO EML and AWaRe
- Incorporation of patient preferences
- National adaptation is important to reflect our health care system and physician/NP/pharmacist needs
  - Antibiotics that are available in our system
  - Diagnostic testing
  - Integrate Canadian data on AMR
  - Link to tools developed to help Canadian physicians (eg/ PHAC, NACI, Choosing Wisely)
- Incorporated Beta testing feedback from an expanded stakeholder base
- Reference document enabling collaborative adoption with other provincial and local prescribing programs

Panel Chairs

AMMI Canada
Canadian Antibiotic Treatment Guidance

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Dena Zeraratkar, MSc, PhD Co-Chair/Senior Methodologist

Discipline: Research and Guideline Methodology

McMaster University

Hamilton, ON

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Canadian Antibiotic Treatment Guidance

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AMMI Canada: Canadian Antibiotic Treatment Guidance

AMMI Canada
Canadian Antibiotic Treatment Guidance

Financial contribution:
Contribution financière :
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Agence de la santé publique du Canada

Canadian Antibiotic Treatment Guidance

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Adults:

Acute Bronchitis

Acute Sinusitis

Chronic Obstructive Pulmonary Disease

Community Acquired Pneumonia

Pharyngitis

Conjunctivitis

Pediatrics:

Bronchiolitis

Cough Illness/Acute Bronchitis

Acute Sinusitis

Community Acquired Pneumonia

Pharyngitis

Conjunctivitis

Canadian Antibiotic Treatment Guidance

In progress:

Localized Non-bullous Impetigo

Erysipelas and Cellulitis

Diabetic Foot Infections

Uncomplicated and Complicated Urinary Tract Infection

Next syndromes (by March 31 2026):

Acute otitis media

Acute bacterial diarrhea

Enteric fever

C. difficile

Osteomyelitis

Septic arthritis

Canadian Antibiotic Treatment Guidance

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C. difficile

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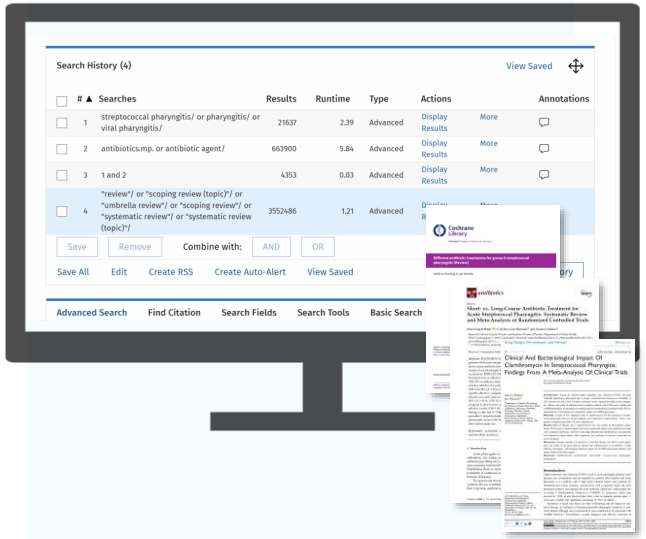
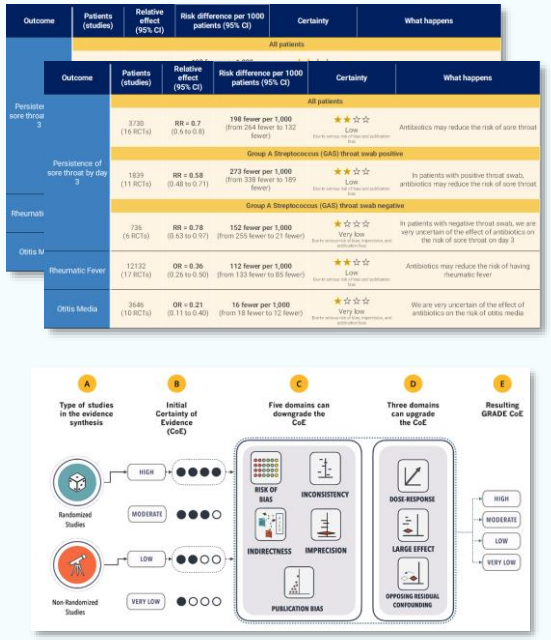
Septic arthritis

Overview of Methods: Adolopment

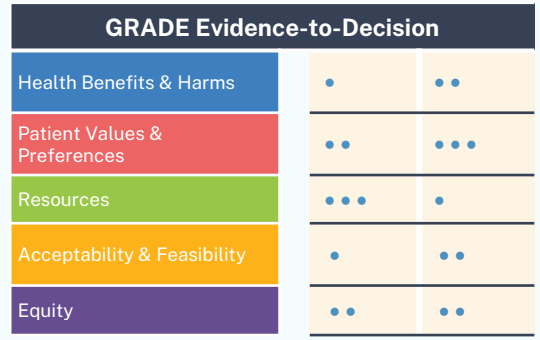
1. Search



2. Data Collection & Assessment of Certainty



3. Evidence to Recommendations



4. Publication

Pharyngitis: GRADE Evidence-to-Decision Framework

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Health Benefits & Harms	How large are the benefits? How large are the harms and burdens? What is the certainty of evidence?
Patient Values & Preferences	What is the importance attached to each desirable and undesirable outcome? Do benefits outweigh harms according to the values and preferences of patients?
Resources	What are the resources required? Would implementing the intervention versus the comparator lead to important costs or savings?
Acceptability & Feasibility	Is the intervention acceptable to patients, their caregivers, and healthcare providers? Is the intervention feasible to implement?
Equity	What would be the impact of implementing the intervention versus the comparator on health equity?

Example: Pharyngitis

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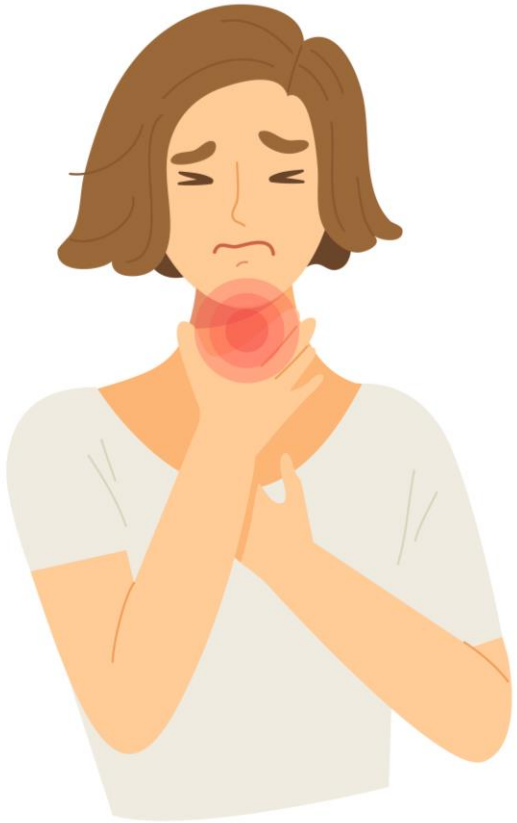
Pharyngitis
Children & Adults



Pharyngitis: Evidence to Recommendations

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Health Benefits & Harms

Patient Values & Preferences

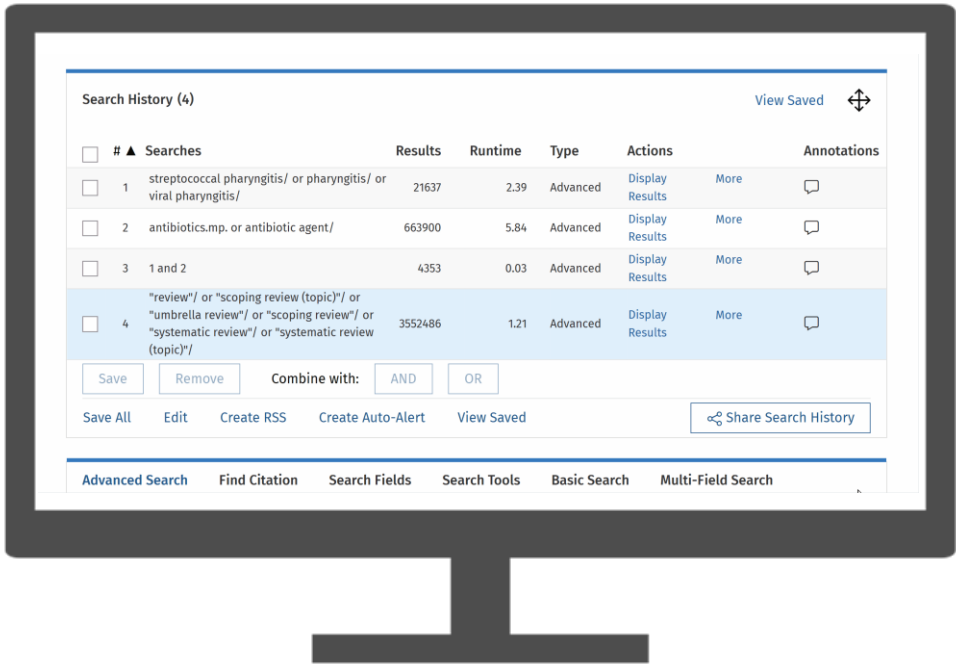
Resources

Acceptability & Feasibility

Equity

P	Children or adults Sore throat With or without positive microbiological test
I	Antibiotics
C	Placebo/no antibiotics Different doses/durations
O	Mortality Clinical cure Adverse events Serious adverse events

Systematic Reviews & Meta-Analyses of RCTs
Published 2014 to present



Pharyngitis: Evidence to Recommendations

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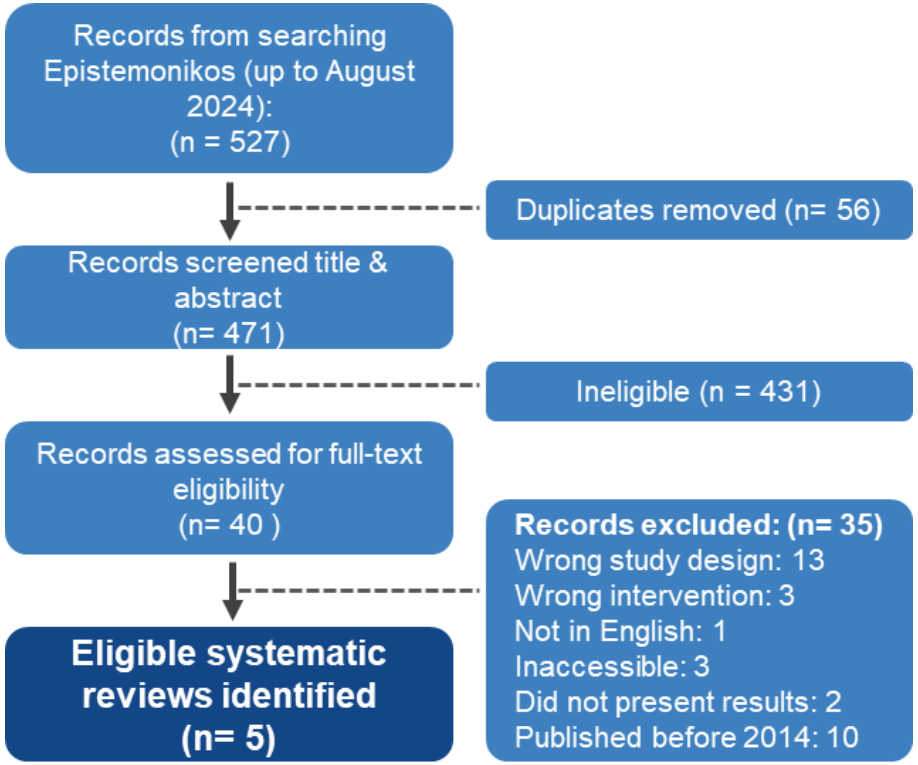

Pharyngitis: Evidence to Recommendations

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Review	Search	Population	Comparisons	Outcomes
Hoban & Nauta (2019)	**Not a bibliographic search**; five RCTs from **Abbott's internal database** of clarithromycin trials (post-1985).	Mainly **adolescents/adults** outpatients with one or more signs suggestive of streptococcal pharyngitis (median age ~30; range **11–83**).	**Clarithromycin** vs **penicillin V** or **erythromycin**	**Clinical cure/improvement**, **bacteriologic eradication**, **adverse events** (reported across trials).
Holm (2020)	MEDLINE search **Jan 1966–Dec 2019**.	**Children and adults** in **primary care** with *confirmed* GABHS.	**Short (≤5 days)** vs **long (≥7 days)** antibiotic regimens (penicillins, macrolides, cephalosporins, etc.).	**Early clinical cure**, **early bacterial eradication**; **adverse events**.
Spinks (2021)	CENTRAL 2021-Issue 2; MEDLINE to **April wk 1, 2021**; Embase to **Apr 2021**; trial registries **6 Apr 2021**.	**Children and adults** with acute sore throat (GABHS positive/negative subgroups).	**Antibiotics vs control** (placebo or no treatment).	**Patient-important symptoms at day 3** and 1 week; fever; headache; complications: acute **rheumatic fever, acute glomerulonephritis**, otitis media, sinusitis, quinsy.
Hedin (2023)	CENTRAL, MEDLINE, Embase, Web of Science; trial registries **19 Mar 2023**	**Children and adults** with *confirmed* group A β-hemolytic streptococcal (GABHS) tonsillopharyngitis.	Head-to-head **antibiotic class** comparisons Cephalosporins vs. Penicillin Macrolides vs. penicillin Azithromycin vs. Amoxicillin Clindamycin vs. Ampicillin Sulfonamides vs. Penicillin	Patient-important symptoms (resolution; sore throat; fever), **duration**, **relapse**, **complications** (suppurative, acute rheumatic fever, post-streptococcal glomerulonephritis), and **adverse events**.
Spurling (2023)	Latest update searched **20 Aug 2022** (Issue 10, 2023).	**Children and adults** with mixed; conditions include **sore throat, AOM, cough/bronchitis, common cold**. Review only found a trial of **children**	**Delayed vs immediate**, Delayed vs no antibiotics	**Pain, malaise, fever** (level and duration), **antibiotic use**, **patient satisfaction**, **adverse events**, **reconsultation** (no trials reported resistance outcomes).

Pharyngitis: Evidence to Recommendations

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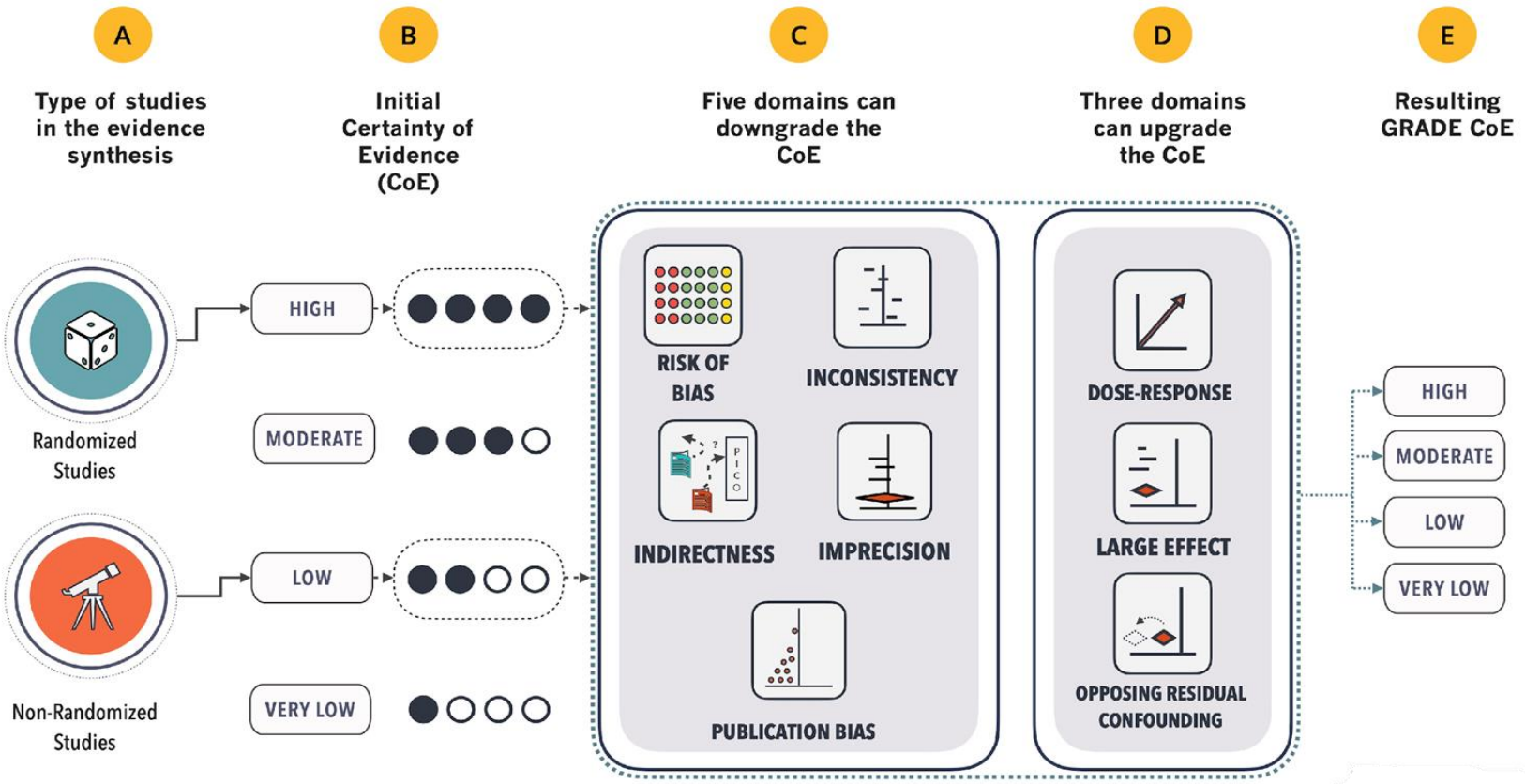

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Pharyngitis: Evidence to Recommendations

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Spinks 2021: Antibiotics vs. No Antibiotics/Placebo

Outcome	Patients (studies)	Relative effect (95% CI)	Risk difference per 1000 patients (95% CI)	Certainty	What happens
Persistence of sore throat by day 3	Bmmqbujf out				
	4841)27!SDUt *	SS!>!1/8)1/7!up!1/9*	2: 9!gf x f slqf sl2-111)gspn !375!gf x f slup!243! gf x f s*	★★☆☆ Mpx Evf !up!t f sjpvt !sjt l !pgcjbt !boe!qvcnjdbujpo! cjbt	Boujcjpujdt !n bz!sf evdf !ui f !sjt l !pgt psf !ui spbu
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Pharyngitis: Evidence to Recommendations

AMMI Canada

Health Benefits & Harms

Patient Values & Preferences

Resources

Acceptability & Feasibility

Equity

Holm 2020: 5 vs 7 Days of Antibiotic Therapy

Outcome	Patients (studies)	Relative effect (95% CI)	Risk difference per 1000 patients (95% CI)	Certainty	What happens
Clinical cure	18581 (47 RCTs)	OR = 0.95 (0.79 to 1.15)	3 fewer per 1,000 (from 17 fewer to 9 more)	★★★☆ Moderate Due to serious risk of bias	Short term antibiotic therapy is probably little or no different than standard longer courses for achieving early clinical cure
Adverse Events	14081 (39 RCTs)	OR = 1.35 (1.08 to 1.68)	29 more per 1,000 (from 7 more to 55 more)	★★★☆ Moderate Due to serious risk of bias	Short term antibiotic therapy probably has little to no effect on the risk of adverse events compared to standard longer courses

Pharyngitis: Evidence to Recommendations

AMMI Canada

Health Benefits & Harms

Patient Values & Preferences

Resources

Acceptability & Feasibility

Equity

- **Low certainty evidence suggests that antibiotics may reduce the proportion of patients who experience sore throat on day 3**
  - For patients with a positive test for group A streptococcus, low certainty evidence suggests that antibiotics may reduce the proportion of patients who experience sore throat on day 3
  - For patients with a negative test for group A streptococcus, we are very uncertain of the effects of antibiotics on sore throat symptoms on day 3
- **Low certainty evidence suggests that antibiotics may reduce incidence of rheumatic fever** but we are very uncertain on its effects on other adverse events (otitis media, sinusitis, quinsy, glomerulonephritis)
- **There is no compelling evidence that any antibiotic or antibiotic class (penicillin, amoxicillin, azithromycin, cephalosporins, macrolides) is superior to any other for achieving clinical cure**
- Moderate certainty evidence suggests that **short antibiotic therapy (5 days or less) is little or no different than longer antibiotic therapy (7 days or more)** for achieving clinical cure

Pharyngitis: Evidence to Recommendations

AMMI Canada

Health Benefits & Harms

Patient Values & Preferences

Resources

Acceptability & Feasibility

Equity

- **Low certainty evidence suggests that antibiotics may reduce the proportion of patients who experience sore throat on day 3**
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Pharyngitis: Evidence to Recommendations

AMMI Canada

Health Benefits & Harms

Patient Values & Preferences

Resources

Acceptability & Feasibility

Equity

Antibiotic Stewardship Principles

- Antimicrobial resistance **threatens both individual patients and the community**.
- Prescribers should offer or consider **non-antibiotic alternatives when antibiotics provide limited benefit**.
- Clinicians should base empiric antibiotic selection on **local resistance patterns**.
- When possible, **choose narrower-spectrum antibiotics** that specifically target the expected pathogens while sparing gut flora, rather than broader-spectrum agents, to limit resistance development (**Access > Watch > Reserve**).
- When culture results are available, **target therapy to the identified or suspected pathogen** instead of continuing broad-spectrum coverage
- Offer **antibiotics with a lower risk of causing *Clostridioides difficile* infection** over those with a higher risk.
- Use the **shortest effective duration of antibiotic therapy** to reduce exposure, minimize selection pressure for resistant organisms, and decrease the risk of side effects and *C. difficile* infection.

Pharyngitis: Evidence to Recommendations

AMMI Canada

Health Benefits & Harms

Patient Values & Preferences

Resources

Acceptability & Feasibility

Equity

! **Broadest spectrum**

- Cefiderocol
- Colistin
- Polymyxin B
- Meropenem-vaborbactam
- Imipenem-relebactam
- Ceftazidime-avibactam
- Ceftolozane-tazobactam
- Tigecycline
- Meropenem or Doripenem
- Ertapenem
- Piperacillin-tazobactam
- Ticarcillin-clavulanate
- Fosfomycin
- Moxifloxacin
- Levofloxacin
- Ciprofloxacin
- Doxycycline
- Amikacin
- Tobramycin
- Gentamicin
- Cefipime
- Ceftazidime
- Trimethoprim-sulfamethoxazole
- Ampicillin-sulbactam
- Amoxicillin-clavulanate
- Ceftaroline
- Ceftriaxone
- Cefuroxime
- Cefazolin
- Ampicillin
- Amoxicillin
- Penicillin

! **Narrowest spectrum**

Pharyngitis: Evidence to Recommendations

AMMI Canada

- Health Benefits & Harms
- **Patient Values & Preferences**
- Resources
- Acceptability & Feasibility
- Equity

The evidence doesn't make decisions… people do!

Pharyngitis: Evidence to Recommendations

AMMI Canada

- Health Benefits & Harms
- **Patient Values & Preferences**
- Resources
- Acceptability & Feasibility
- Equity

Pharyngitis: Evidence to Recommendations

AMMI Canada

- Health Benefits & Harms
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Pharyngitis: Evidence to Recommendations

AMMI Canada

- Health Benefits & Harms
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Pharyngitis: Evidence to Recommendations

AMMI Canada

- Health Benefits & Harms
- **Patient Values & Preferences**
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Pharyngitis: Evidence to Recommendations

AMMI Canada

- Health Benefits & Harms
- **Patient Values & Preferences**
- Resources
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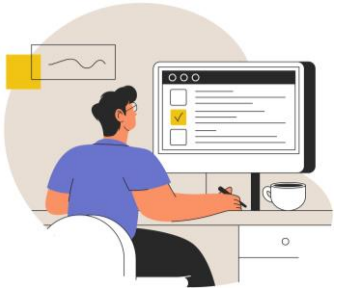
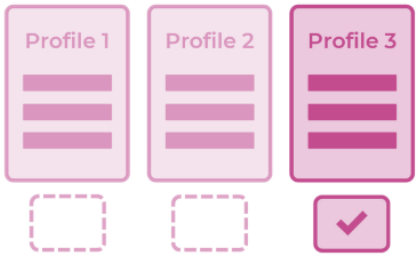
Surveys	Discrete Choice Experiments	Qualitative Interviews/Focus Groups
		
Quantifies patients' attitudes, beliefs, and preferences about antibiotic use and stewardship practices. Identifies prevalence of specific views or behaviors in large populations.	Elicits relative importance of attributes influencing patient decisions regarding antibiotics (e.g., symptom relief time, side effects, cost, resistance risk). Reveals trade-offs patients are willing to make.	Explores why and how patients hold certain beliefs or make choices about antibiotic. Uncover contextual factors and social norms shaping decision-making.

Pharyngitis: Evidence to Recommendations

AMMI Canada

Health Benefits & Harms

Patient Values & Preferences

Resources

Acceptability & Feasibility

Equity

- Patients value outcomes such as **mortality and serious adverse events more highly than clinical cure or antibiotic resistance**.
- For self-limiting conditions, **patients prioritize avoiding serious adverse events over achieving a faster clinical cure**.
- Patients prefer antibiotics that require **less frequent dosing, have shorter treatment durations, cost less, and are available in oral formulations**.
- Patients **adhere less to antibiotics that cause adverse effects**.
- Patients' **preference for antibiotics declines once they receive counseling** about antibiotic resistance.
- Children prefer **oral antibiotics that taste pleasant**.

Pharyngitis: Evidence to Recommendations

AMMI Canada

Health Benefits & Harms

Patient Values & Preferences

Resources

Acceptability & Feasibility

Equity

Category	Cost per day ($)	Antibiotic
💰	0-20	**Amoxicillin**, **amoxicillin/clavulanic acid**, **ampicillin**, **azithromycin**, benzylpenicillin, **cefadroxil, cefalexin**, cefazolin, cefixime, cefprozil, cefuroxime, ciprofloxacin, **clarithromycin**, **clindamycin**, cloxacillin, doxycycline, erythromycin, fosfomycin, gentamicin, levofloxacin, metronidazole, minocycline, moxifloxacin, nitrofurantoin, norfloxacin, **phenoxymethylpenicillin**, **sulfamethoxazole and trimethoprim**, tetracycline, tobramycin, trimethoprim
💰💰	21-40	Cefotaxime, ceftriaxone, linezolid
💰💰💰	41-100	Cefepime, cefoxitin, colistin, daptomycin, ertapenem, imipenem and cilastatin, piperacillin and tazobactam
💰💰💰💰	>100	Amikacin, aztreonam, ceftazidime, ceftolozane and tazobactam, dalbavancin, meropenem, streptomycin, tigecycline, vancomycin

Pharyngitis: Evidence to Recommendations

AMMI Canada

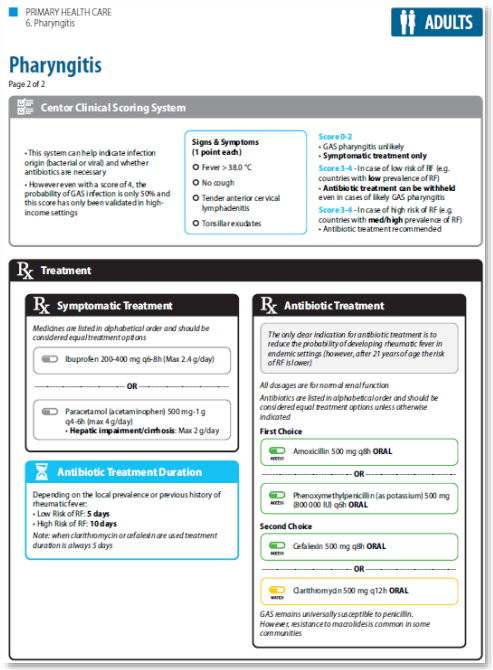
- Health Benefits & Harms
- Patient Values & Preferences
- Resources
- Acceptability & Feasibility
- **Equity**

Incidence of Rheumatic Fever	
Children	0.3 per 100,000 PY
Adults	0.1 per 100,000 PY
Manitoba : Indigenous	5.0 per 100,000 PY
Manitoba: Non-Indigenous	0.6 per 100,000 PY
Northwestern Ontario: First Nations	21.3 per 100,000 PY

Pharyngitis: Evidence to Recommendations

AMMI Canada

Health Benefits & Harms	Patient Values & Preferences	Resources	Acceptability & Feasibility	Equity



PRIMARY HEALTH CARE
6. Pharyngitis

ADULTS

Pharyngitis

Page 2 of 2

Centor Clinical Scoring System

- This system can help indicate infection origin (bacterial or viral) and whether antibiotics are necessary
- However even with a score of 4, the probability of GAS infection is only 50% and this score has only been validated in high-income settings

Signs & Symptoms (1 point each)
- Fever > 38.0 °C
- No cough
- Tender anterior cervical lymphadenitis
- Tonsillar exudates

Score 0-2
- GAS pharyngitis unlikely
- **Symptomatic treatment only**

Score 3-4 - In case of low risk of RF (e.g. countries with **low** prevalence of RF)
- **Antibiotic treatment can be withheld** even in cases of likely GAS pharyngitis

Score 3-4 - In case of high risk of RF (e.g. countries with **med/high** prevalence of RF)
- Antibiotic treatment recommended

Treatment

Symptomatic Treatment

Medicines are listed in alphabetical order and should be considered equal treatment options

Ibuprofen 200-400 mg q6-8h (Max 2.4 g/day)

OR

Paracetamol (acetaminophen) 500 mg-1 g q4-6h (max 4 g/day)
- **Hepatic impairment/cirrhosis**: Max 2 g/day

Antibiotic Treatment Duration

Depending on the local prevalence or previous history of rheumatic fever:
- Low Risk of RF: **5 days**
- High Risk of RF: **10 days**

Note: when clarithromycin or cefalexin are used treatment duration is always 5 days

Antibiotic Treatment

The only clear indication for antibiotic treatment is to reduce the probability of developing rheumatic fever in endemic settings (however, after 21 years of age the risk of RF is lower)

All dosages are for normal renal function

Antibiotics are listed in alphabetical order and should be considered equal treatment options unless otherwise indicated

First Choice

Amoxicillin 500 mg q8h **ORAL**

OR

Phenoxymethylpenicillin (as potassium) 500 mg (800 000 IU) q6h **ORAL**

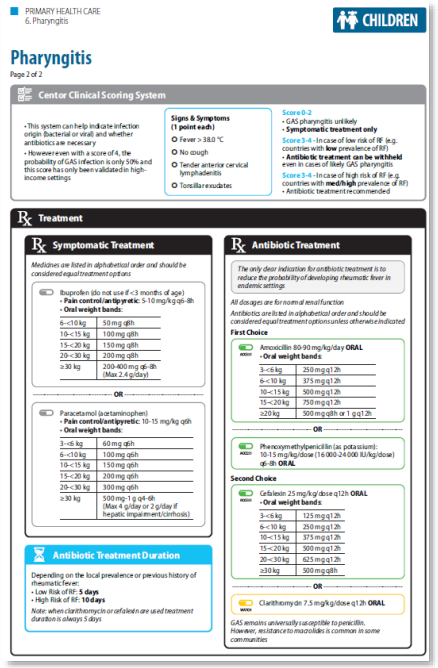
Second Choice

Cefalexin 500 mg q8h **ORAL**

OR

Clarithromycin 500 mg q12h **ORAL**

GAS remains universally susceptible to penicillin. However, resistance to macrolides is common in some communities



PRIMARY HEALTH CARE
6. Pharyngitis

CHILDREN

Pharyngitis

Page 2 of 2

Centor Clinical Scoring System

- This system can help indicate infection origin (bacterial or viral) and whether antibiotics are necessary
- However even with a score of 4, the probability of GAS infection is only 50% and this score has only been validated in high-income settings

Signs & Symptoms (1 point each)
- Fever > 38.0 °C
- No cough
- Tender anterior cervical lymphadenitis
- Tonsillar exudates

Score 0-2
- GAS pharyngitis unlikely
- **Symptomatic treatment only**

Score 3-4 - In case of low risk of RF (e.g. countries with **low** prevalence of RF)
- **Antibiotic treatment can be withheld** even in cases of likely GAS pharyngitis

Score 3-4 - In case of high risk of RF (e.g. countries with **med/high** prevalence of RF)
- Antibiotic treatment recommended

Treatment

Symptomatic Treatment

Medicines are listed in alphabetical order and should be considered equal treatment options

Ibuprofen (do not use if <3 months of age)
- **Pain control/antipyretic**: 5-10 mg/kg q6-8h
- **Oral weight bands:**

6–<10 kg	50 mg q8h
10–<15 kg	100 mg q8h
15–<20 kg	150 mg q8h
20–<30 kg	200 mg q8h
≥30 kg	200-400 mg q6-8h (Max 2.4 g/day)

OR

Paracetamol (acetaminophen)
- **Pain control/antipyretic**: 10-15 mg/kg q6h
- **Oral weight bands:**

3–<6 kg	60 mg q6h
6–<10 kg	100 mg q6h
10–<15 kg	150 mg q6h
15–<20 kg	200 mg q6h
20–<30 kg	300 mg q6h
≥30 kg	500 mg-1 g q4-6h (Max 4 g/day or 2 g/day if hepatic impairment/cirrhosis)

Antibiotic Treatment Duration

Depending on the local prevalence or previous history of rheumatic fever:
- Low Risk of RF: **5 days**
- High Risk of RF: **10 days**

Note: when clarithromycin or cefalexin are used treatment duration is always 5 days

Antibiotic Treatment

The only clear indication for antibiotic treatment is to reduce the probability of developing rheumatic fever in endemic settings

All dosages are for normal renal function

Antibiotics are listed in alphabetical order and should be considered equal treatment options unless otherwise indicated

First Choice

Amoxicillin 80-90 mg/kg/day **ORAL**
- **Oral weight bands**

3–<6 kg	250 mg q12h
6–<10 kg	375 mg q12h
10–<15 kg	500 mg q12h
15–<20 kg	750 mg q12h
≥20 kg	500 mg q8h or 1 g q12h

OR

Phenoxymethylpenicillin (as potassium): 10-15 mg/kg/dose (16 000-24 000 IU/kg/dose) q6-8h **ORAL**

Second Choice

Cefalexin 25 mg/kg/dose q12h **ORAL**
- **Oral weight bands**

3–<6 kg	125 mg q12h
6–<10 kg	250 mg q12h
10–<15 kg	375 mg q12h
15–<20 kg	500 mg q12h
20–<30 kg	625 mg q12h
≥30 kg	500 mg q8h

OR

Clarithromycin 7.5 mg/kg/dose q12h **ORAL**

GAS remains universally susceptible to penicillin. However, resistance to macrolides is common in some communities

Pharyngitis: Evidence to Recommendations

AMMI Canada

Health Benefits & Harms	Patient Values & Preferences	Resources	Acceptability & Feasibility	Equity

Strong Recommendations

Strong recommendations indicate situations where benefits *clearly* outweigh harms — such as adverse effects or the risk of antibiotic resistance — for nearly all patients.

Most well-informed patients will choose to follow the suggested course.

Conditional 'weak' Recommendations

Conditional recommendations indicate situations in which benefits likely outweigh harms, but uncertainty or close trade-offs mean some patients may choose otherwise.

Plan for shared decision-making.

Pharyngitis: Evidence to Recommendations

AMMI Canada

Recommendations		Adults	Children
Pharyngitis other than Group A Streptococcus		***Watchful waiting*** *(conditional)*	
Group A Streptococcus Pharyngitis	First choice	**Penicillin V** 600 mg PO BID for 5 days	**Penicillin V** 10-15 mg/kg/dose PO TID or QID for 5 days (maximum daily dose: 3000 mg/day) **Amoxicillin** 50 mg/kg/day PO once daily for 5 days (maximum daily dose: 1000 mg/day)
	Second Choice	**Amoxicillin** 500 mg PO TID for 5 days **Cephalexin** 500 mg PO BID for 5 days **Clarithromycin** 500 mg PO BID for 5 days	**Cephalexin** 20 mg/kg/dose PO BID for 5 days (maximum daily dose: 4000 mg/day) **Clarithromycin** 7.5 mg/kg/dose PO BID for 5 days (maximum daily dose: 1000 mg/day)
Remarks		• We prefer **penicillin over amoxicillin for children who can tolerate tablets**. For those who cannot, we recommend amoxicillin in suspension form. • Indiscriminate testing may produce false positives and lead to unnecessary antibiotic use. **The Centor clinical scoring system may help identify patients at higher risk of Group A Streptococcal pharyngitis who may benefit from testing**. Consistent with Choosing Wisely, clinicians can test patients with Centor scores of 2 or greater. • **Although the incidence of rheumatic fever has declined in Canada, it still occurs among certain communities**, such as Indigenous communities. Clinicians should be aware of patients at higher risk of complications from untreated Group A Streptococcal pharyngitis. • For patients at high risk of rheumatic fever, clinicians may consider prescribing antibiotics for 5 to 10 days.	

Pharyngitis: Evidence to Recommendations

AMMI Canada

Recommendations		Adults	Children
Pharyngitis other than Group A Streptococcus		***Watchful waiting*** *(conditional)*	
Group A Streptococcus Pharyngitis	First choice	**Penicillin V** 600 mg PO BID for 5 days	**Penicillin V** 10-15 mg/kg/dose PO TID or QID for 5 days (maximum daily dose: 3000 mg/day) **Amoxicillin** 50 mg/kg/day PO once daily for 5 days (maximum daily dose: 1000 mg/day)
	Second Choice	**Amoxicillin** 500 mg PO TID for 5 days **Cephalexin** 500 mg PO BID for 5 days **Clarithromycin** 500 mg PO BID for 5 days	**Cephalexin** 20 mg/kg/dose PO BID for 5 days (maximum daily dose: 4000 mg/day) **Clarithromycin** 7.5 mg/kg/dose PO BID for 5 days (maximum daily dose: 1000 mg/day)
Remarks		• We prefer **penicillin over amoxicillin for children who can tolerate tablets**. For those who cannot, we recommend amoxicillin in suspension form. • Indiscriminate testing may produce false positives and lead to unnecessary antibiotic use. **The Centor clinical scoring system may help identify patients at higher risk of Group A Streptococcal pharyngitis who may benefit from testing**. Consistent with Choosing Wisely, clinicians can test patients with Centor scores of 2 or greater. • **Although the incidence of rheumatic fever has declined in Canada, it still occurs among certain communities**, such as Indigenous communities. Clinicians should be aware of patients at higher risk of complications from untreated Group A Streptococcal pharyngitis. • For patients at high risk of rheumatic fever, clinicians may consider prescribing antibiotics for 5 to 10 days.	

Pharyngitis: Evidence to Recommendations

AMMI Canada

Recommendations	Adults	Children
Pharyngitis other than Group A Streptococcus	*Watchful waiting (conditional)*	
Group A Streptococcus Pharyngitis – First choice		D TID or QID for 5 days day) nce daily for 5 days day)
Group A Streptococcus Pharyngitis – Second Choice		BID for 5 days (maximum PO BID for 5 days day)
Remarks		, we recommend amoxicillin **ntor clinical scoring system** **from testing**. Consistent

- **Although the incidence of rheumatic fever has declined in Canada, it still occurs among certain communities**, such as Indigenous communities. Clinicians should be aware of patients at higher risk of complications from untreated Group A Streptococcal pharyngitis.
- For patients at high risk of rheumatic fever, clinicians may consider prescribing antibiotics for 5 to 10 days.

Duration of Antibiotic Therapy

World Health Organization (WHO)	5 days High risk of rheumatic fever: 10 days
National Institute for Health and Care Excellence (NICE)	5 days
Canadian Paediatric Society (CPS)	10 days
German Clinical Practice Guidelines	5 to 7 days
Infectious Diseases Society of America (IDSA)	10 days

Pharyngitis: Evidence to Recommendations

AMMI Canada

Recommendations		Adults	Children
Pharyngitis other than Group A Streptococcus		***Watchful waiting*** *(conditional)*	
Group A Streptococcus Pharyngitis	First choice	**Penicillin V** 600 mg PO BID for 5 days	**Penicillin V** 10-15 mg/kg/dose PO TID or QID for 5 days (maximum daily dose: 3000 mg/day) **Amoxicillin** 50 mg/kg/day PO once daily for 5 days (maximum daily dose: 1000 mg/day)
	Second Choice	**Amoxicillin** 500 mg PO TID for 5 days **Cephalexin** 500 mg PO BID for 5 days **Clarithromycin** 500 mg PO BID for 5 days	**Cephalexin** 20 mg/kg/dose PO BID for 5 days (maximum daily dose: 4000 mg/day) **Clarithromycin** 7.5 mg/kg/dose PO BID for 5 days (maximum daily dose: 1000 mg/day)
Remarks		• We prefer **penicillin over amoxicillin for children who can tolerate tablets**. For those who cannot, we recommend amoxicillin in suspension form. • Indiscriminate testing may produce false positives and lead to unnecessary antibiotic use. **The Centor clinical scoring system may help identify patients at higher risk of Group A Streptococcal pharyngitis who may benefit from testing**. Consistent with Choosing Wisely, clinicians can test patients with Centor scores of 2 or greater. • **Although the incidence of rheumatic fever has declined in Canada, it still occurs among certain communities**, such as Indigenous communities. Clinicians should be aware of patients at higher risk of complications from untreated Group A Streptococcal pharyngitis. • For patients at high risk of rheumatic fever, clinicians may consider prescribing antibiotics for 5 to 10 days.	

Example: Mild/Moderate Community-Acquired Pneumonia (CAP) in Adults

Mild/ Moderate Community-Acquired Pneumonia

Adults

Mild/Moderate Adult CAP: Evidence to Recommendations

AMMI Canada

Health Benefits & Harms

Patient Values & Preferences

Resources

Acceptability & Feasibility

Equity

Review	Outcome	Antibiotic	Comparator	Relative effect	Absolute effect	Certainty
Choi 2023 (Clinical Infectious Diseases) *Outpatients*	Clinical cure	Doxycycline	Macrolides (erythromycin, spiramycin)	RR = 1.76 (0.71 to 4.34)	89 more per 1,000 (69 fewer to 175 more)	Very Low
Kurotschka 2024 *Outpatients or inpatients, mild (PSI I–II) or moderate (PSI III–IV) CAP* *Primarily outpatient*	Mortality	Amoxicillin	Clarithromycin	RR = 0.68 (0.14 to 3.29)	3 fewer per 1,000 (9 fewer to 23 more)	Low
		Amoxicillin/Clavulanate		RR = 0.12 (0.00 to 15.49)	9 fewer per 1,000 (10 fewer to 145 more)	Very Low
		Azithromycin		RR = 0.11 (0.01 to 2.09)	9 fewer per 1,000 (10 fewer to 11 more)	Low
		Clarithromycin + Cefuroxime		RR = 1.00 (0.02 to 49.33)	0 fewer per 1,000 (1 fewer to 483 more)	Very Low
		Lefamulin		RR = 0.91 (0.20 to 4.22)	2 fewer per 1,000 (8 fewer to 32 more)	Low
		Levofloxacin		RR = 0.04 (0.00 to 2.84)	10 fewer per 1,000 (10 fewer to 180 more)	Low
		Moxifloxacin		RR = 0.62 (0.21 to 1.81)	4 fewer per 1,000 (8 fewer to 8 more)	Low
	Clinical response	Amoxicillin	Clarithromycin	RR = 0.93 (0.87 to 1.00)	59 fewer per 1,000 (109 fewer to 0 fewer)	Low
		Amoxicillin/Clavulanate		RR = 0.99 (0.94 to 1.05)	8 fewer per 1,000 (50 fewer to 42 more)	Moderate
		Azithromycin		RR = 0.99 (0.94 to 1.04)	8 fewer per 1,000 (50 fewer to 33 more)	Moderate
		Cefpodoxime		RR = 1.00 (0.90 to 1.11)	0 fewer per 1,000 (84 fewer to 92 more)	Moderate
		Clarithromycin + Cefuroxime		RR = 1.00 (0.90 to 1.11)	0 fewer per 1,000 (84 fewer to 92 more)	Moderate
		Lefamulin		RR = 1.01 (0.95 to 1.06)	9 fewer per 1,000 (42 fewer to 5 more)	Moderate
		Levofloxacin		RR = 1.01 (0.95 to 1.07)	8 more per 1,000 (42 fewer to 59 more)	Moderate
		Moxifloxacin		RR = 1.00 (0.96 to 1.04)	0 fewer per 1,000 (33 fewer to 33 more)	Moderate
		Penicillin		RR = 0.85 (0.70 to 1.03)	125 fewer per 1,000 (251 fewer to 25 more)	Low
Pakhale 2014 *Outpatients*	Adverse events	Erythromycin	Clarithromycin	OR = 3.33 (2.17 to 5.00)	278 more per 1,000 (171 more to 376 more)	Moderate
		Azithromycin (microspheres)	Levoflaxacin	OR = 1.78 (1.04 to 3.03)	77 more per 1,000 (4 more to 175 more)	Low

Review	Outcome	Antibiotic	Comparator	Relative effect	Absolute effect	Certainty
Ashy 2022	Clinical cure	Erythromycin	Clarithromycin	RR = 0.67 (0.48 to 0.92)	182 fewer per 1,000 (from 286 fewer to 44 fewer)	Low
Bai 2021	Adverse events	Ceftaroline	Ceftriaxone	RR = 1.03 (0.95 to 1.11)	13 more per 1,000 (from 22 fewer to 49 more)	Moderate
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Choi 2023 (Clinical Infectious Diseases) *Mixed inpatients and outpatients, excluding critically ill patients*	Adverse events	Doxycycline	Macrolides or Fluroquinolones	RR = 0.78 (0.54 to 1.13)	43 fewer per 1,000 (from 96 fewer to 23 more)	Moderate
Du 2021	Clinical response	Moxifloxacin	Levofloxacin	OR = 3.35 (2.35 to 4.77)	141 more per 1,000 (from 112 more to 162 more)	Moderate
	Adverse events	Moxifloxacin	Levofloxacin	OR = 0.77 (0.56 to 1.06)	37 fewer per 1,000 (from 74 fewer to 9 more)	Moderate
Furukawa 2023 *Mixed inpatients and outpatients (primarily inpatients), excluding critically ill patients*	Mortality	3 days antibiotic therapy	10 days antibiotic therapy	OR = 1.11 (0.28 to 4.35)	3 more per 1,000 (from 21 fewer to 89 more)	Low
		5 days antibiotic therapy		OR = 0.93 (0.34 to 2.58)	2 fewer per 1,000 (from 20 fewer to 44 more)	Low
		7 days antibiotic therapy		OR = 0.84 (0.23 to 3.09)	5 fewer per 1,000 (from 23 fewer to 57 more)	Low
	Clinical improvement	3 days antibiotic therapy	10 days antibiotic therapy	OR = 1.24 (0.86 to 1.78)	36 more per 1,000 (from 28 fewer to 86 more)	Moderate
		5 days antibiotic therapy		OR = 1.16 (0.82 to 1.63)	25 more per 1,000 (from 37 fewer to 75 more)	Moderate
		7 days antibiotic therapy		OR = 1.09 (0.74 to 1.60)	15 more per 1,000 (from 58 fewer to 73 more)	Moderate
	Serious adverse events	3 days antibiotic therapy	10 days antibiotic therapy	OR = 0.73 (0.27 to 1.96)	44 fewer per 1,000 (from 130 fewer to 125 more)	Very Low
		5 days antibiotic therapy		OR = 0.80 (0.51 to 1.24)	32 fewer per 1,000 (from 83 fewer to 35 more)	Low
		7 days antibiotic therapy		OR = 0.86 (0.40 to 1.85)	22 fewer per 1,000 (from 104 fewer to 113 more)	Very Low
Lan 2020 *Mild to severe CAP*	Clinical cure	IV/PO levofloxacin for 5 days	IV/PO levofloxacin for >5 days	OR = 0.90 (0.55 to 1.43)	8 fewer per 1,000 (from 57 fewer to 23 more)	Moderate

Mild/Moderate Adult CAP: Evidence to Recommendations

AMMI Canada

Health Benefits & Harms

Patient Values & Preferences

Resources

Acceptability & Feasibility

Equity

Review	Outcome	Antibiotic	Comparator	Relative effect	Absolute effect	Certainty
Choi 2023 (Clinical Infectious Diseases) *Outpatients*	Clinical cure	Doxycycline	Macrolides (erythromycin, spiramycin)	RR = 1.76 (0.71 to 4.34)	89 more per 1,000 (69 fewer to 175 more)	Very Low
Kurotschka 2024 *Outpatients or inpatients, mild (PSI I–II) or moderate (PSI III–IV) CAP* *Primarily outpatient*	Mortality	Amoxicillin	Clarithromycin	RR = 0.68 (0.14 to 3.29)	3 fewer per 1,000 (9 fewer to 23 more)	Low
		Amoxicillin/Clavulanate		RR = 0.12 (0.00 to 15.49)	9 fewer per 1,000 (10 fewer to 145 more)	Very Low
		Azithromycin		RR = 0.11 (0.01 to 2.09)	9 fewer per 1,000 (10 fewer to 11 more)	Low
		Clarithromycin + Cefuroxime		RR = 1.00 (0.02 to 49.33)	0 fewer per 1,000 (1 fewer to 483 more)	Very Low
		Lefamulin		RR = 0.91 (0.20 to 4.22)	2 fewer per 1,000 (8 fewer to 32 more)	Low
		Levofloxacin		RR = 0.04 (0.00 to 2.84)	10 fewer per 1,000 (10 fewer to 180 more)	Low
		Moxifloxacin		RR = 0.62 (0.21 to 1.81)	4 fewer per 1,000 (8 fewer to 8 more)	Low
	Clinical response	Amoxicillin	Clarithromycin	RR = 0.93 (0.87 to 1.00)	59 fewer per 1,000 (109 fewer to 0 fewer)	Low
		Amoxicillin/Clavulanate		RR = 0.99 (0.94 to 1.05)	8 fewer per 1,000 (50 fewer to 42 more)	Moderate
		Azithromycin		RR = 0.99 (0.94 to 1.04)	8 fewer per 1,000 (50 fewer to 33 more)	Moderate
		Cefpodoxime		RR = 1.00 (0.90 to 1.11)	0 fewer per 1,000 (84 fewer to 92 more)	Moderate
		Clarithromycin + Cefuroxime		RR = 1.00 (0.90 to 1.11)	0 fewer per 1,000 (84 fewer to 92 more)	Moderate
		Lefamulin		RR = 1.01 (0.95 to 1.06)	9 fewer per 1,000 (42 fewer to 5 more)	Moderate
		Levofloxacin		RR = 1.01 (0.95 to 1.07)	8 more per 1,000 (42 fewer to 59 more)	Moderate
		Moxifloxacin		RR = 1.00 (0.96 to 1.04)	0 fewer per 1,000 (33 fewer to 33 more)	Moderate
		Penicillin		RR = 0.85 (0.70 to 1.03)	125 fewer per 1,000 (251 fewer to 25 more)	Low
Pakhale 2014 *Outpatients*	Adverse events	Erythromycin	Clarithromycin	OR = 3.33 (2.17 to 5.00)	278 more per 1,000 (171 more to 376 more)	Moderate
		Azithromycin (microspheres)	Levoflaxacin	OR = 1.78 (1.04 to 3.03)	77 more per 1,000 (4 more to 175 more)	Low

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Mild/Moderate Adult CAP: Evidence to Recommendations

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Mild/Moderate Adult CAP: Evidence to Recommendations

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Health Benefits & Harms

Patient Values & Preferences

Resources

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Equity

Antibiotic	FDA Boxed Warning
Levofloxacin, Moxifloxacin	Tendinopathy, Neuropathy, Myasthenia Gravis
Tigecycline	Increased risk of all-cause mortality compared to other agents

!! Azithromycin and clarithromycin are associated with prolonged QT interval on ECG and polymorphic ventricular tachycardia but this is not an FDA Boxed Warning

Mild/Moderate Adult CAP: Evidence to Recommendations

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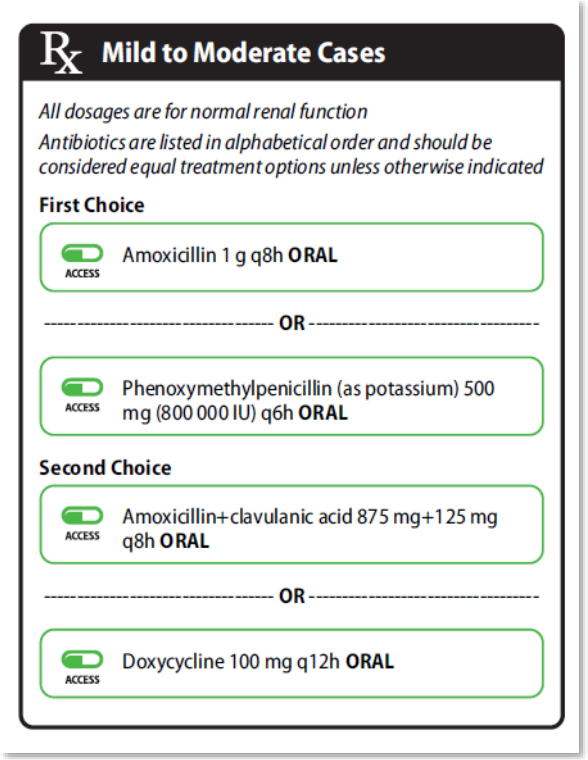
Category	Cost per day ($)	Antibiotic
💰	0-20	**Amoxicillin**, **amoxicillin/clavulanic acid**, ampicillin, **azithromycin**, benzylpenicillin, cefadroxil, cefalexin, cefazolin, cefixime, cefprozil, **cefuroxime**, ciprofloxacin, **clarithromycin**, clindamycin, cloxacillin, **doxycycline**, **erythromycin**, fosfomycin, gentamicin, **levofloxacin**, metronidazole, minocycline, **moxifloxacin**, nitrofurantoin, norfloxacin, **phenoxymethylpenicillin**, sulfamethoxazole and trimethoprim, tetracycline, tobramycin, trimethoprim
💰💰	21-40	Cefotaxime, **ceftriaxone**, linezolid
💰💰💰	41-100	Cefepime, cefoxitin, colistin, daptomycin, ertapenem, imipenem and cilastatin, piperacillin and tazobactam
💰💰💰💰	>100	Amikacin, aztreonam, ceftazidime, ceftolozane and tazobactam, dalbavancin, meropenem, streptomycin, **tigecycline**, vancomycin

Mild/Moderate Adult CAP: Evidence to Recommendations

AMMI Canada

Health Benefits & Harms	Moderate certainty: moxifloxacin probably increases clinical response compared with levofloxacin Low certainty: clarithromycin may increase clinical cure compared to erythromycin; penicillin may reduce clinical cure Duration: 3, 5, 7, and 10 days of therapy are likely little or no different for achieving clinical cure
Patient Values & Preferences	..
Resources	Most antibiotics studied for mild/moderate CAP cost <$20/day Antibiotics that may reduce complications and improve cure may reduce costs associated with CAP morbidity
Acceptability & Feasibility	..
Equity	..



Mild/Moderate Adult CAP: Evidence to Recommendations

First Choice *(conditional)*	Second Choice *(conditional)*
Amoxicillin 1 g PO TID for 5 days	**Azithromycin** 500 mg PO on day 1 followed by 250 mg PO once daily for 4 days OR 500 mg PO daily for 3 days **Doxycycline** 100 mg PO BID for 5 days **Clarithromycin** 500 mg PO BID for 5 days

Remarks

- Clinicians find it challenge to classify **severity of CAP**. The panel considered patients at higher risk of mortality, patients requiring inpatient management, and patients with C(U)RB-65 scores 2 or greater as being severe but noted that there is no evidence that management based on clinical scores improves patient outcomes.
- The panel noted that in situations in which patients may be reassessed at 3 days and have clinically improved, **a shorter duration of therapy is reasonable and may reduce the potential for antibiotic resistance**. However, in most clinical situations, early reassessment is not feasible, and thus the panel suggests 5 days of therapy.
- Some guidelines recommend 500 mg amoxicillin. The guideline panel suggests a dose of 1 g, consistent with doses evaluated in clinical trials.
- Azithromycin may be dosed at 500 mg on day 1, followed by 250 mg once daily for 4 days or 500 mg once daily for 3 days. The panel did not find evidence suggesting that either of the two dosing regimens is preferred and so recommends either dosing option.

Mild/Moderate Adult CAP: Evidence to Recommendations

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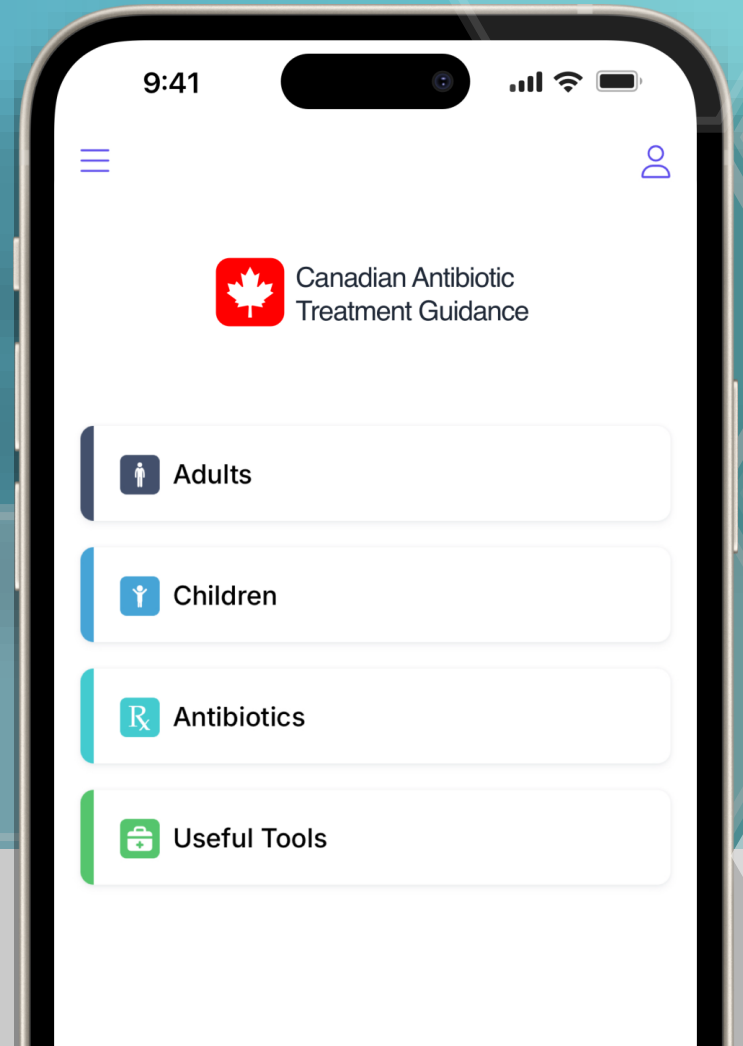
November 13, 2025

From Evidence to Action: Initial Launch of the Canadian Antibiotic Treatment Guidance

Michael Long, PhD
Chief Clinical Officer
Firstline



Firstline

AMMI Canada

Financial contribution:
Contribution financière :
Public Health Agency of Canada
Agence de la santé publique du Canada

Introduction

Pan-Canadian Action Plan on Antimicrobial Resistance

Pillar 3: Stewardship

Desired Outcome 1

“

Prescribers and other professionals in Canada have the resources, training, and tools to facilitate appropriate antimicrobial use in humans and animals.

Action

“

Develop, implement and promote guidelines/standards for appropriate AMU in humans and animals…

Firstline

Clinical decision support at the point of care

- Empiric therapy guidelines
- Antimicrobial information
- Pathogen information
- Antibiograms
- Infection prevention
- Vaccination schedules
- Push notifications
- and more…

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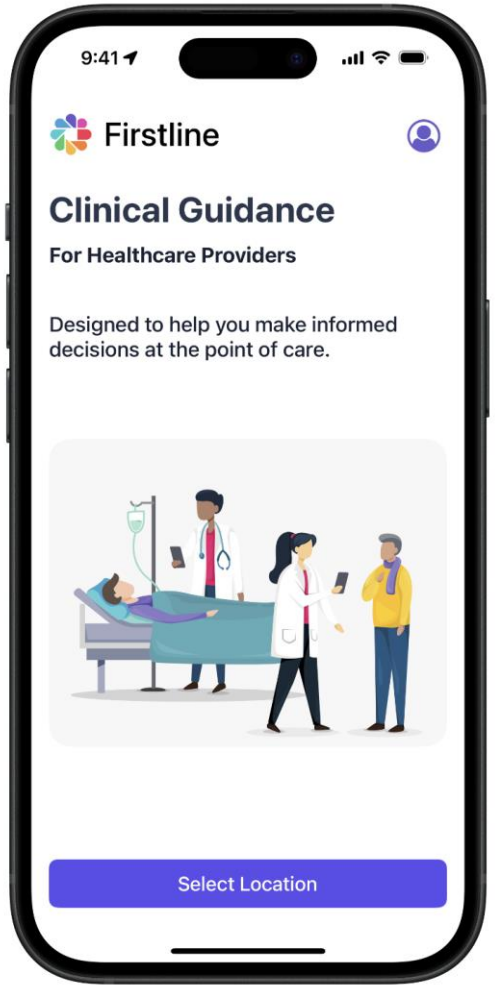
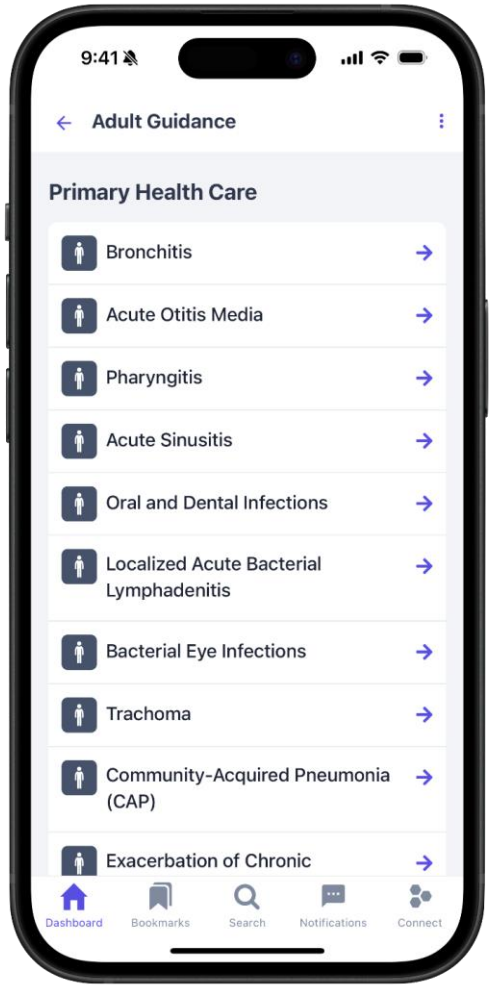
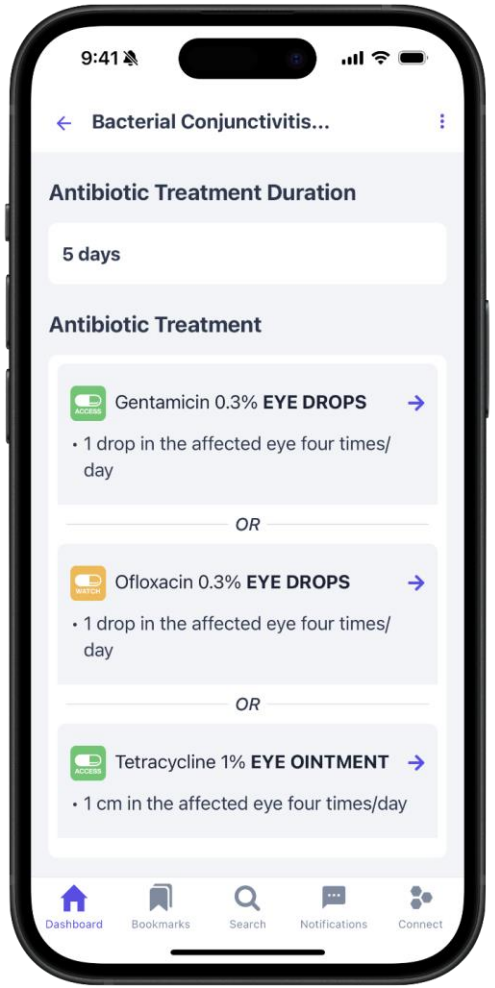
GET IT ON Google Play







Firstline

Supporting antimicrobial stewardship globally

- Firstline is the official infectious disease reference at over 400 hospitals worldwide
- Available in 6 languages
- Partners include hospitals, health systems, cities, provinces, nations and international organizations

Outcomes

Newfoundland & Labrador Centre for Health Information

Highlights

- Decreased antimicrobial consumption
- Increased prescribing appropriateness

PLOS ONE

RESEARCH ARTICLE

Impact of a mobile decision support tool on antimicrobial stewardship indicators in St. John's, Canada

Daniel Doyle[1], Gerald McDonald[2], Claire Pratt[1], Zahra Rehan[1], Tammy Benteau[3], Jennifer Phillips[2], Peter Daley[1,2]*

1 Memorial University of Newfoundland, St. John's, Newfoundland and Labrador, Canada, **2** Eastern Health Region, St. John's, Newfoundland and Labrador, Canada, **3** Choosing Wisely Newfoundland and Labrador, St. John's, Newfoundland and Labrador, Canada

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Check for updates

OPEN ACCESS

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Data Availability Statement: All relevant data are within the manuscript and its S1 and S2 Datas.

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Abstract

Objectives

Inappropriate antibiotic use contributes to antimicrobial resistance. The Spectrum™ app provides antibiotic decision support, based on local antimicrobial resistance rates. We determined the impact of regional implementation of the app on inpatient antimicrobial appropriateness, inpatient antimicrobial usage (AMU), population-based *Clostridioides difficile* infection (CDI) rates and cost, using a retrospective, before and after quasi-experimental design, including a one-year study period.

Methods

The Spectrum™ app was released to prescribers in February, 2019. We performed two one-day inpatient point prevalence surveys using the National Antimicrobial Prescribing Survey tool, six months before (June 25, 2018) and six months after (June 25, 2019) app dissemination. Inpatient AMU in Defined Daily Dose/1000 patient days and CDI incidence were compared, before and after app dissemination.

Results

The pre-survey included 184 prescriptions, and the post-survey included 197 prescriptions. Appropriateness was 97/176 (55.1%) pre, and 126/192 (65.6%) post (+10.5%, p = 0.051). Inpatient AMU declined by 6.6 DDD/1000 patient days per month, and CDI declined by 0.3 cases per month. Cost savings associated with reduced AMU were $403.98/bed/year and associated with reduced CDI were $82,078/year.

Conclusion

We observed improvement in antimicrobial stewardship indicators following Spectrum™ implementation. We cannot determine the cause of these improvements.

Azienda Ospedaliera Universitaria Integrata Verona

Highlights

- Decreased antimicrobial consumption
- Increased prescribing appropriateness
- Decreased 30-day readmissions

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journal homepage: www.elsevier.com/locate/jhin

Enforcing surveillance of antimicrobial resistance and antibiotic use to drive stewardship: experience in a paediatric setting

A. Zaffagnini [a], E. Rigotti [b], F. Opri [b], R. Opri [b], G. Simiele [b], M. Tebon [a], M. Sibani [a], the ENSURE Working Group [†], G. Piacentini [b], E. Tacconelli [a], E. Carrara [a,*]

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Implementation

SUMMARY

Background: Antibiotic stewardship (AS) interventions in paediatrics are still not standardized regarding methodology, metrics, and outcomes. We report the results of an AS intervention in the paediatric area based on education and guideline provision via an electronic App.

Materials and methods: The AS intervention was conducted in 2021 through observation, education, audit and feedback and provision of an electronic App (Firstline.org) to support antibiotic prescription based on local susceptibility data. The primary outcome was the antibiotic consumption in the 12 months following the intervention (year 2022) compared with a historical 12-month control (year 2019) via an interrupted time series analysis. Secondary outcomes were appropriateness of therapy, length of stay, 30-day readmission, transfers to the paediatric intensive care unit, in-hospital mortality, and prevalence of antimicrobial resistance (AMR).

Results: During the post-intervention phase, 29 cross-sectional audits and feedback were conducted including 467 patients. Prescriptions were appropriate according to the guidelines in 85.7% of cases, with a stable trend over time. A significant decrease in antibiotic consumption was measured in terms of defined daily doses per 1000 patient days (-222.13; $P<0.001$) and days of therapy per 1000 patient days (-452.49; $P<0.001$) in the post-intervention period with a clear inversion of the Access to Watch ratio (from 0.7 to 1.7). Length of stay, in-hospital mortality, intensive care unit transfers, and incidence of AMR infections remained stable, while 30-day readmission decreased from 4.9 per 100 admissions to 2.8 per 100 admissions ($P<0.001$).

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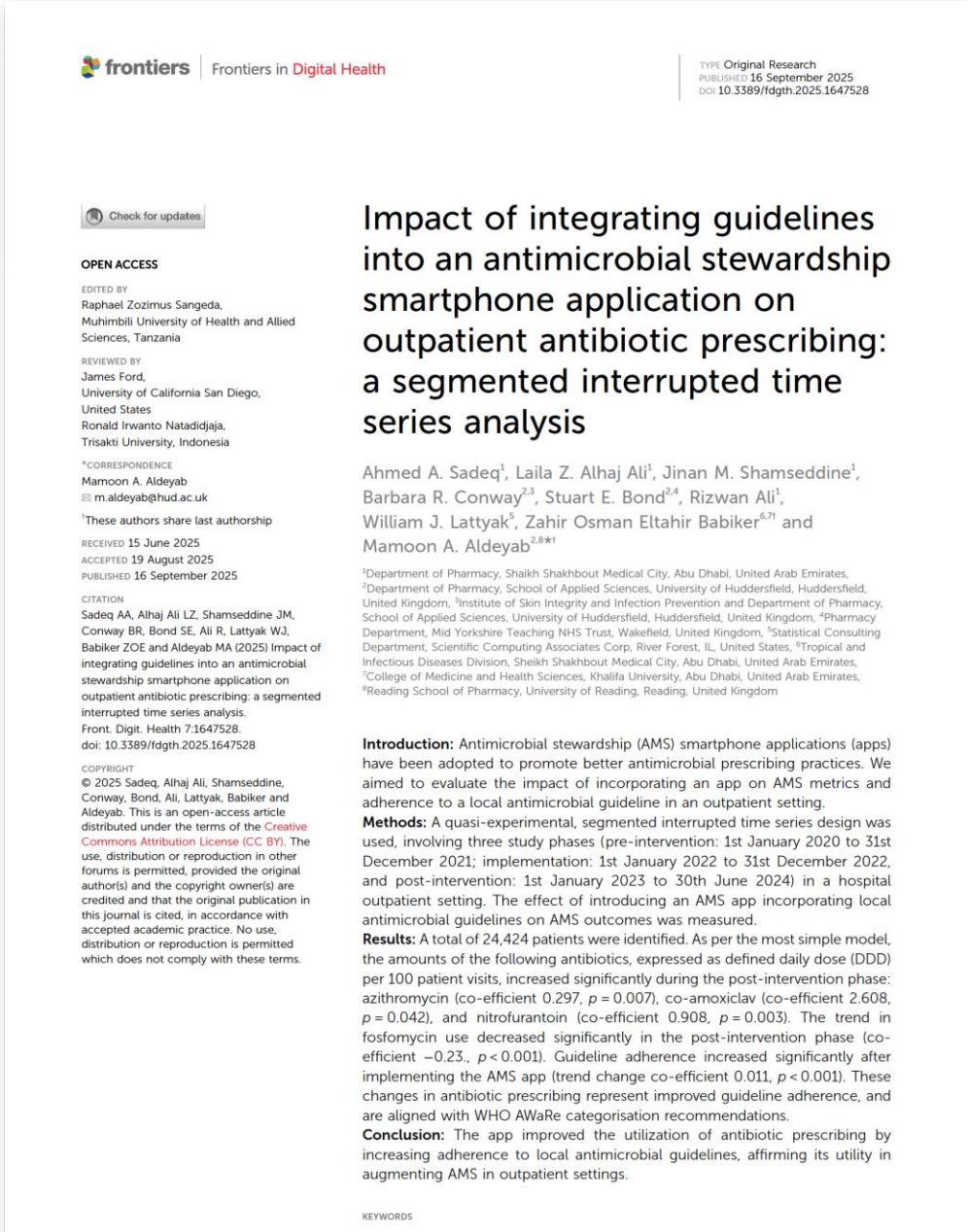
Sheikh Shakhbout Medical City

Highlights

- Outpatient setting
- Increased adherence to local guidelines



frontiers | Frontiers in Digital Health

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Impact of integrating guidelines into an antimicrobial stewardship smartphone application on outpatient antibiotic prescribing: a segmented interrupted time series analysis

Ahmed A. Sadeq[1], Laila Z. Alhaj Ali[1], Jinan M. Shamseddine[1], Barbara R. Conway[2,3], Stuart E. Bond[2,4], Rizwan Ali[1], William J. Lattyak[5], Zahir Osman Eltahir Babiker[6,7†] and Mamoon A. Aldeyab[2,8*†]

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Introduction: Antimicrobial stewardship (AMS) smartphone applications (apps) have been adopted to promote better antimicrobial prescribing practices. We aimed to evaluate the impact of incorporating an app on AMS metrics and adherence to a local antimicrobial guideline in an outpatient setting.
Methods: A quasi-experimental, segmented interrupted time series design was used, involving three study phases (pre-intervention: 1st January 2020 to 31st December 2021; implementation: 1st January 2022 to 31st December 2022, and post-intervention: 1st January 2023 to 30th June 2024) in a hospital outpatient setting. The effect of introducing an AMS app incorporating local antimicrobial guidelines on AMS outcomes was measured.
Results: A total of 24,424 patients were identified. As per the most simple model, the amounts of the following antibiotics, expressed as defined daily dose (DDD) per 100 patient visits, increased significantly during the post-intervention phase: azithromycin (co-efficient 0.297, $p = 0.007$), co-amoxiclav (co-efficient 2.608, $p = 0.042$), and nitrofurantoin (co-efficient 0.908, $p = 0.003$). The trend in fosfomycin use decreased significantly in the post-intervention phase (co-efficient −0.23., $p < 0.001$). Guideline adherence increased significantly after implementing the AMS app (trend change co-efficient 0.011, $p < 0.001$). These changes in antibiotic prescribing represent improved guideline adherence, and are aligned with WHO AWaRe categorisation recommendations.
Conclusion: The app improved the utilization of antibiotic prescribing by increasing adherence to local antimicrobial guidelines, affirming its utility in augmenting AMS in outpatient settings.

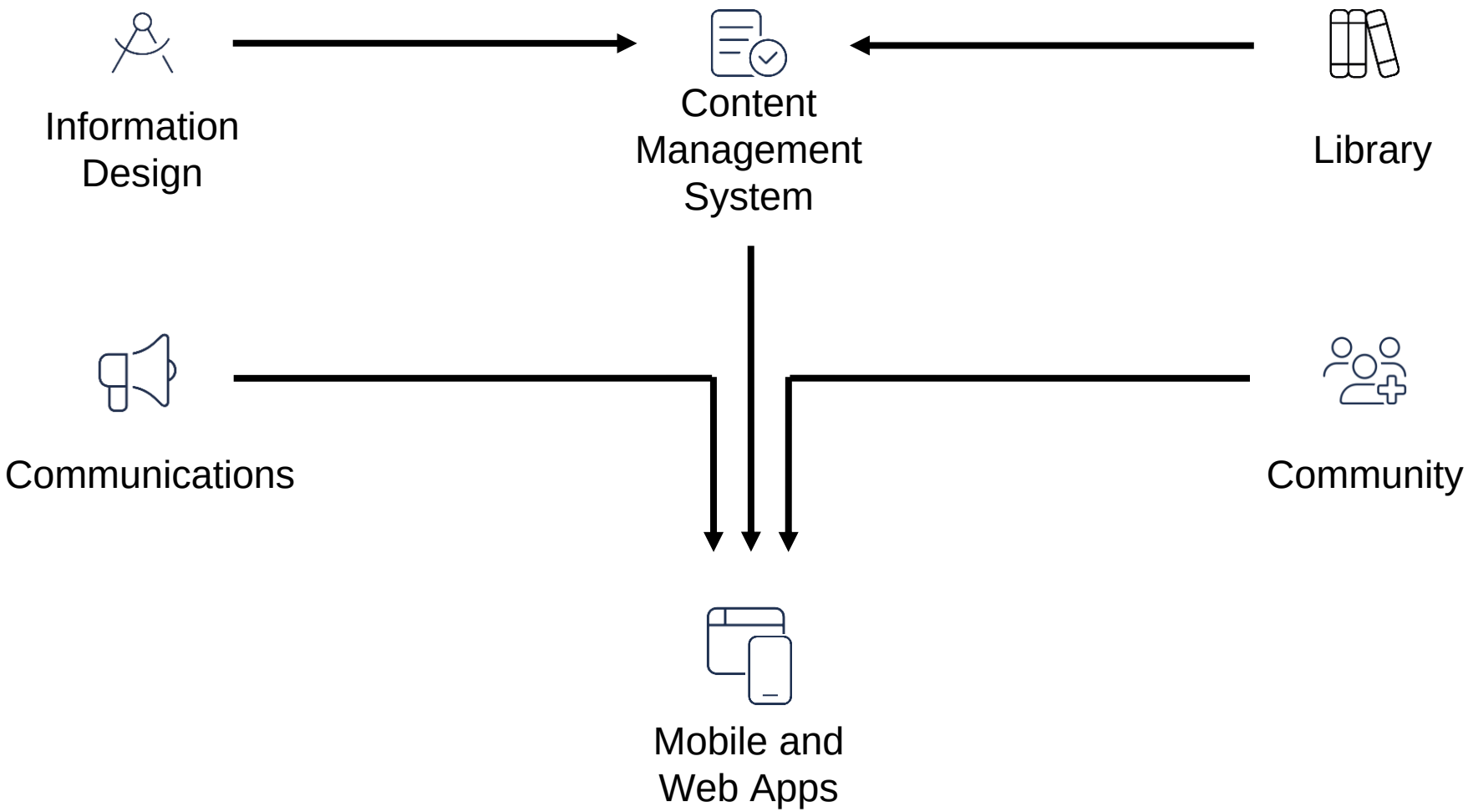
KEYWORDS

Knowledge Mobilization

“The evidence doesn’t make decisions, people do”

Firstline

Knowledge mobilization platform



Information Design

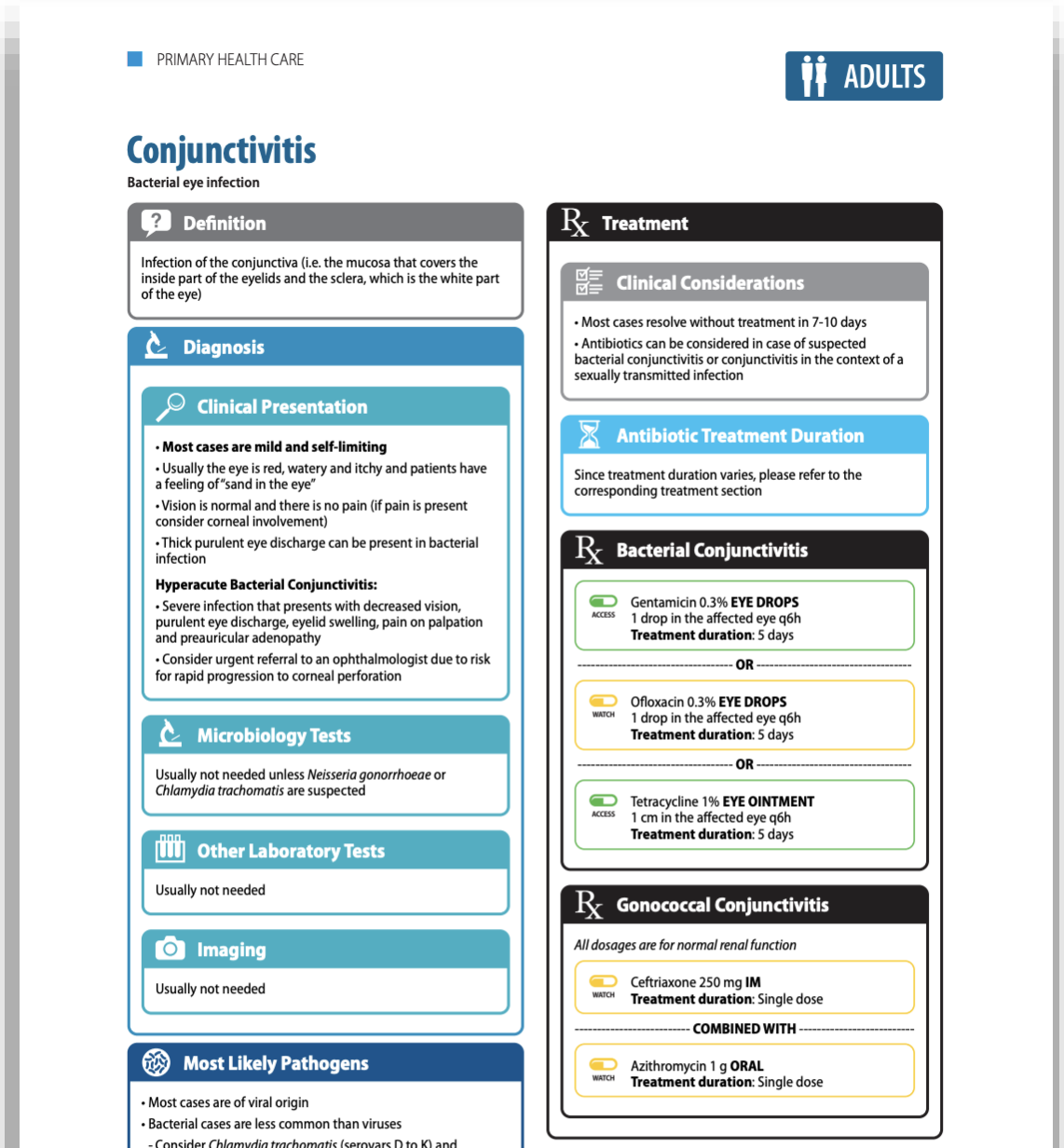
Making guidance easily accessible

Firstline Design System

Standardization: Specifies how colours, icons, fonts, layouts and other interface elements are to be used.

Crystallization: Enriches for content that is useful at the point of care.

Localization: Adapts guidance to reflect regional susceptibilities, patient populations, drug availability, diagnostic methods and so on.



WHO AWaRe Antibiotic Book

- Released in December 2022
- Algorithmic format
- Integrated scoring systems
- Linked antimicrobial information
- Adopted by all UN Peacekeeping Missions
- Identified by WHO as an effective training tool[1]

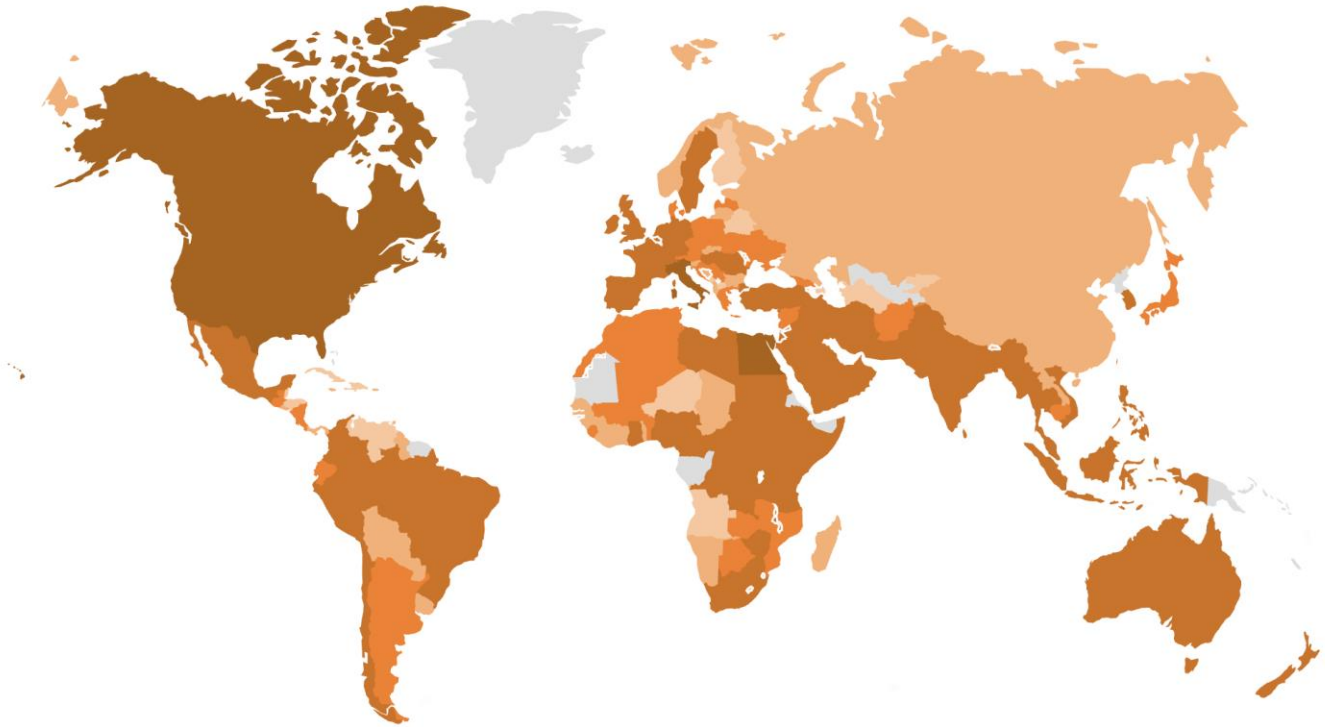
1. Shamas N, Tayler E, Holm M, Amer H, Koya SF. Barriers, facilitators, and opportunities for hospital antimicrobial stewardship in low and lower middle - income countries in the Eastern Mediterranean region: results from a mixed methods study. Antimicrob Resist Infect Control. 2025 Oct 14;14(1):119

WHO AWaRe Antibiotic Book

“

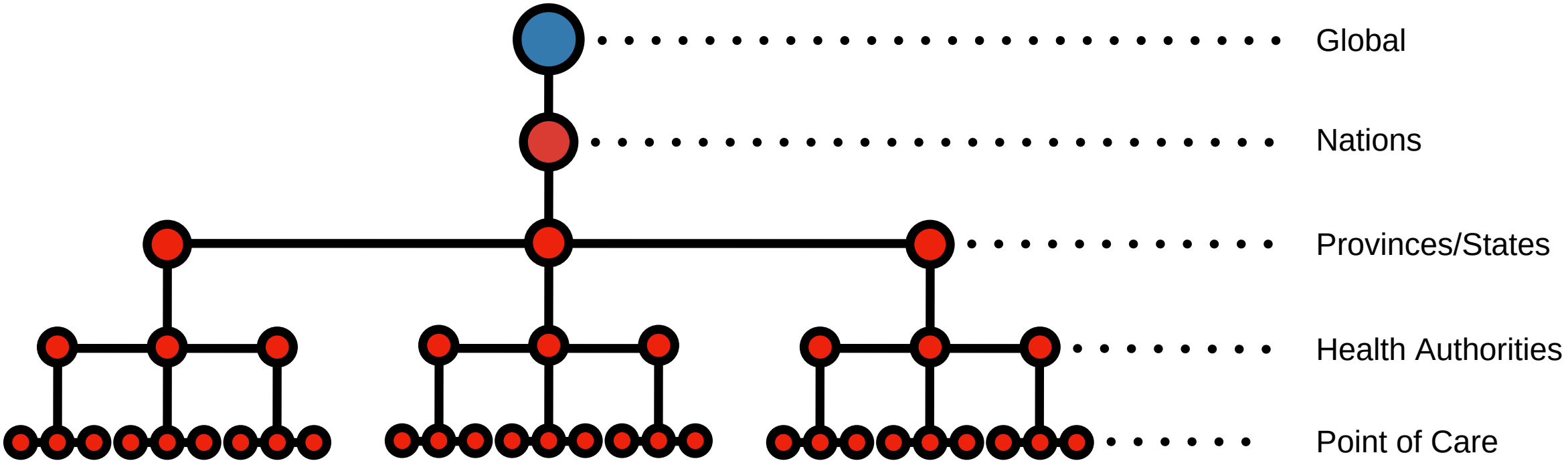
The AWaRe Antibiotic Book is an important and immediately actionable reference. The app-version on Firstline significantly increases access, and we hope it will be used by prescribers everywhere.

Dr. Clive Ondari
WHO Director of Health Product Policy and Standards

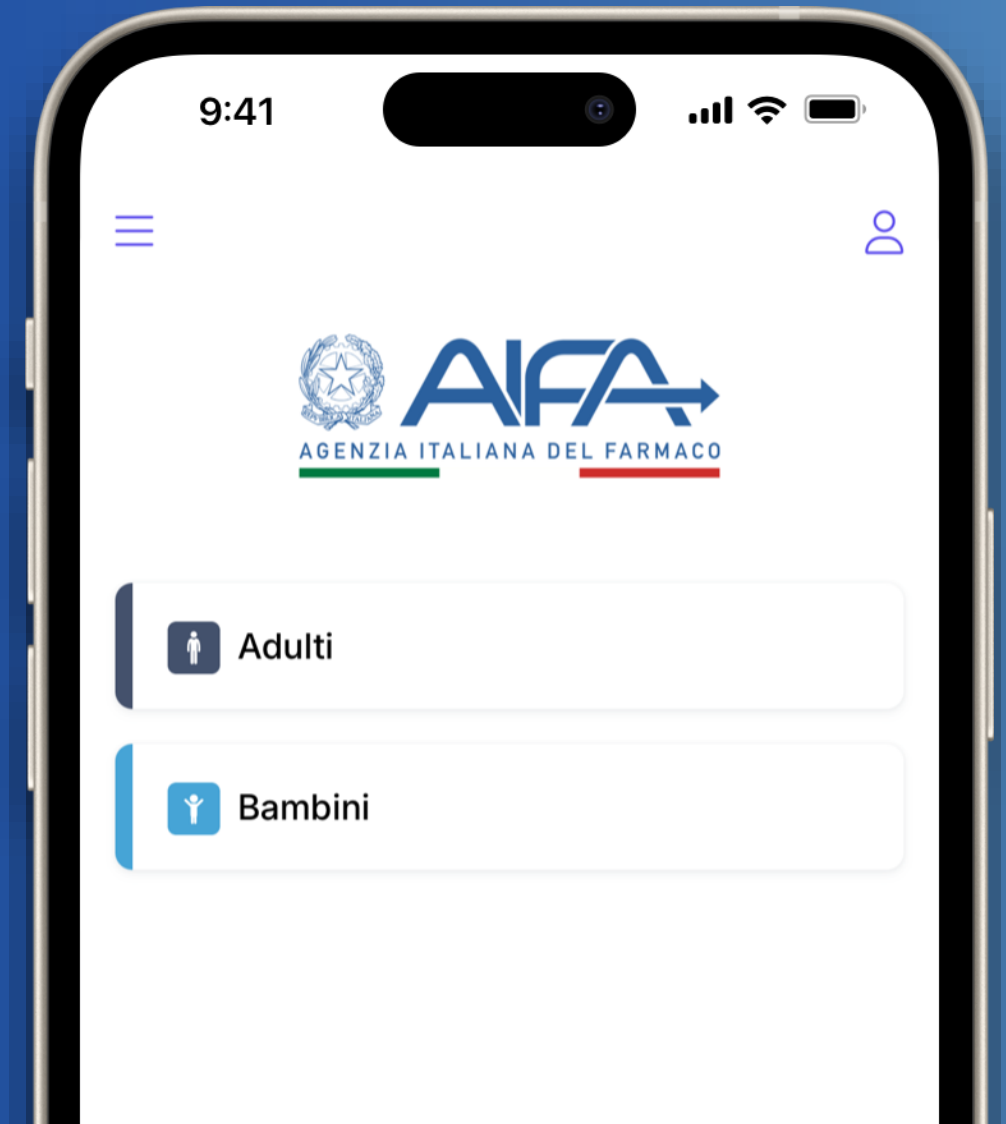


Global usage of WHO guidance on Firstline

Cascading Localization



Italian Antimicrobial Prescribing Guidance

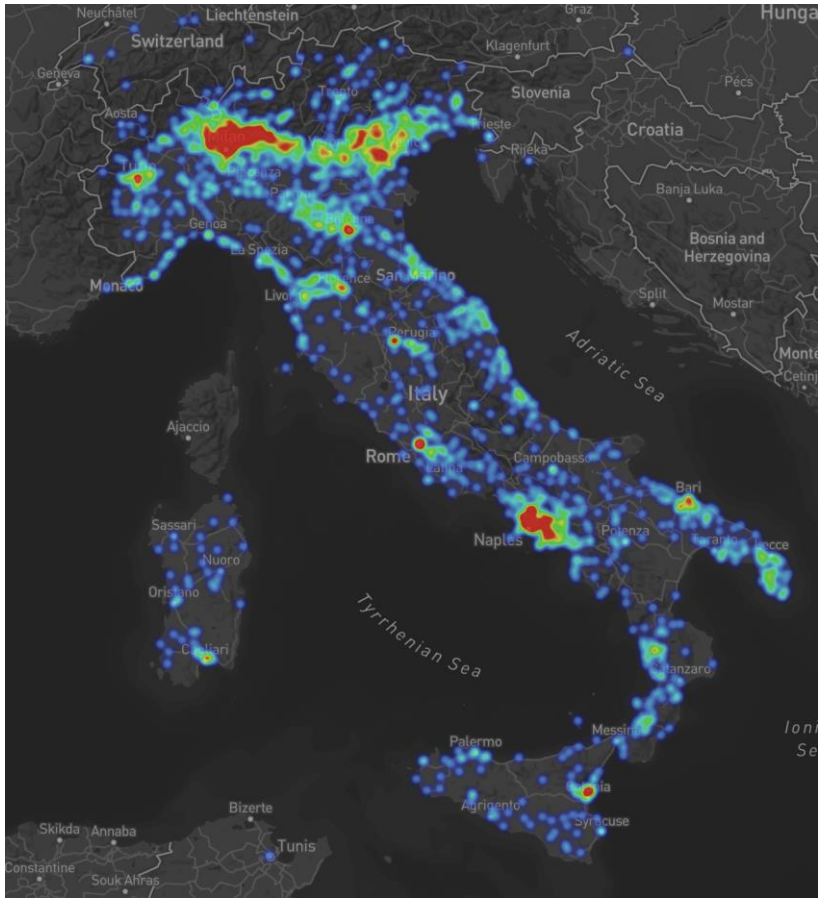


- Released in February 2025
- Based on WHO AWaRe guidance
- Localized in collaboration with the Italian National Medicines Agency
- Outpatient focus
- Regionally localized versions also available on Firstline

Italian Antimicrobial Prescribing Guidance

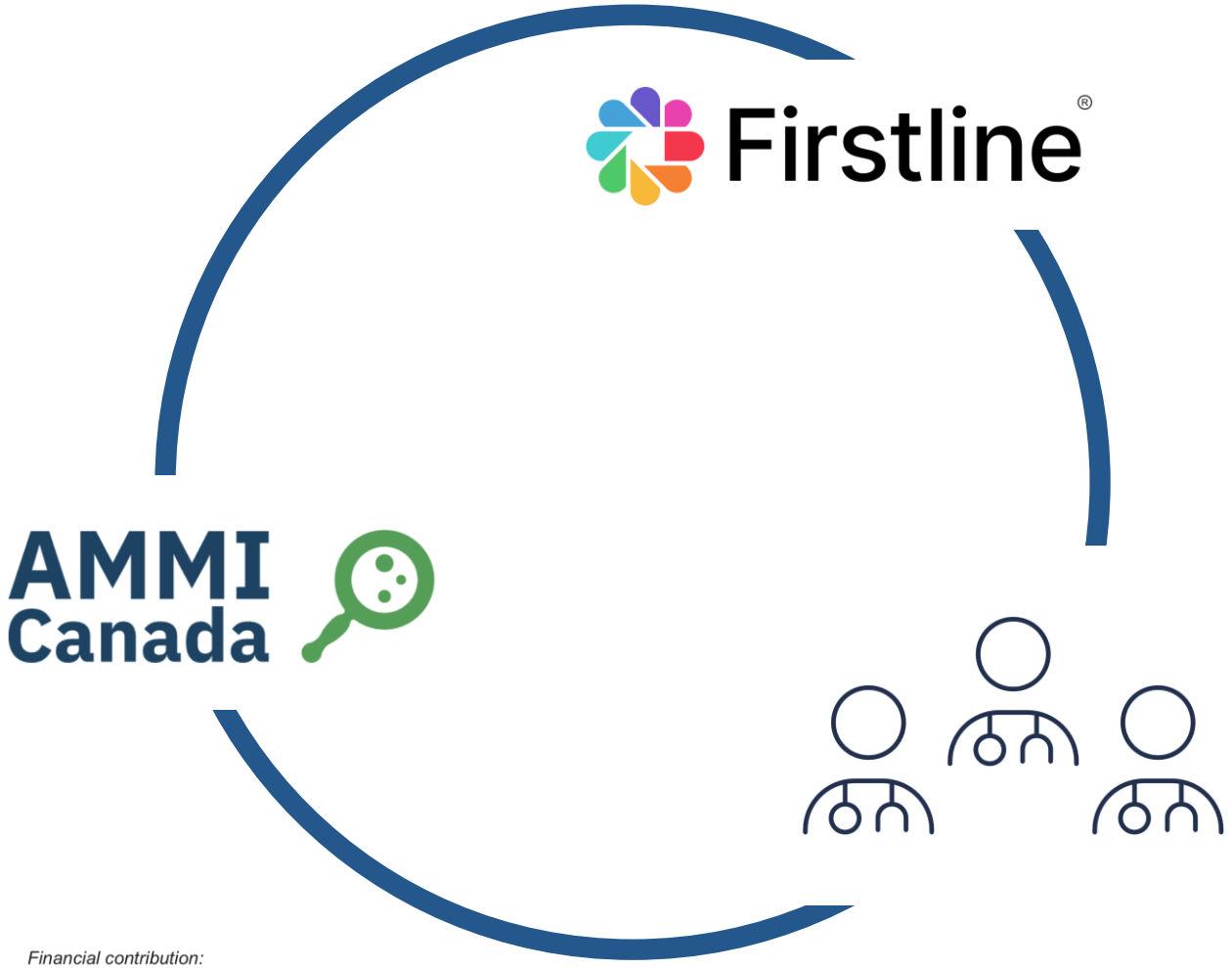
“

The Italian Medicines Agency is committed to promoting a more deeply rooted culture of prudent use of antimicrobials that safeguards health today and for future generations.



National usage of AIFA guidance on Firstline

Canadian Antibiotic Treatment Guidance



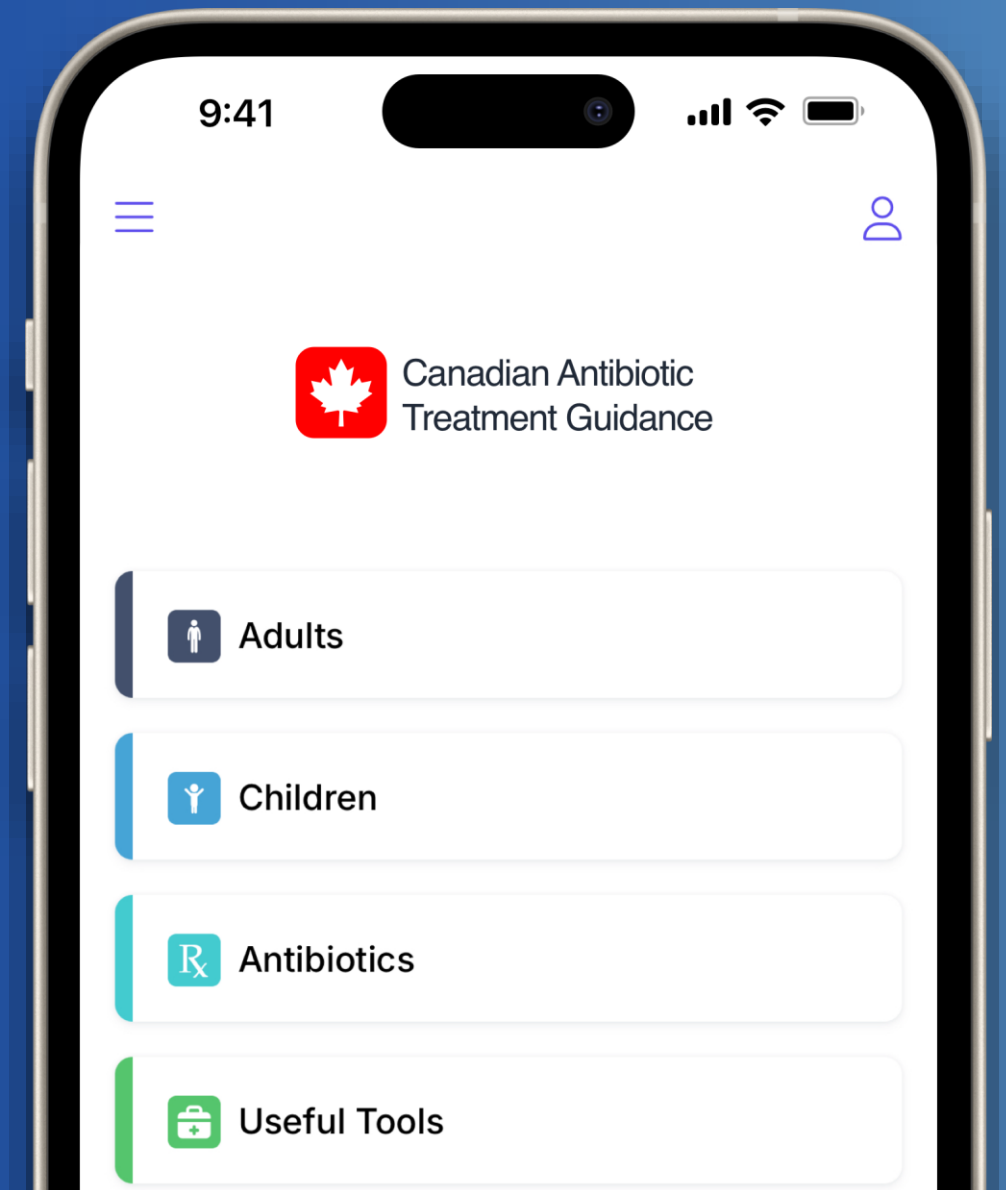
Beta Testing Group Representing:

- Eight provinces
- Six healthcare provider types
- Trainees to late career professionals
- Six practice settings
- English and French speakers
- Adult and pediatric patient populations

Financial contribution:
Contribution financière :

Public Health Agency of Canada
Agence de la santé publique du Canada

Canadian Antibiotic Treatment Guidance



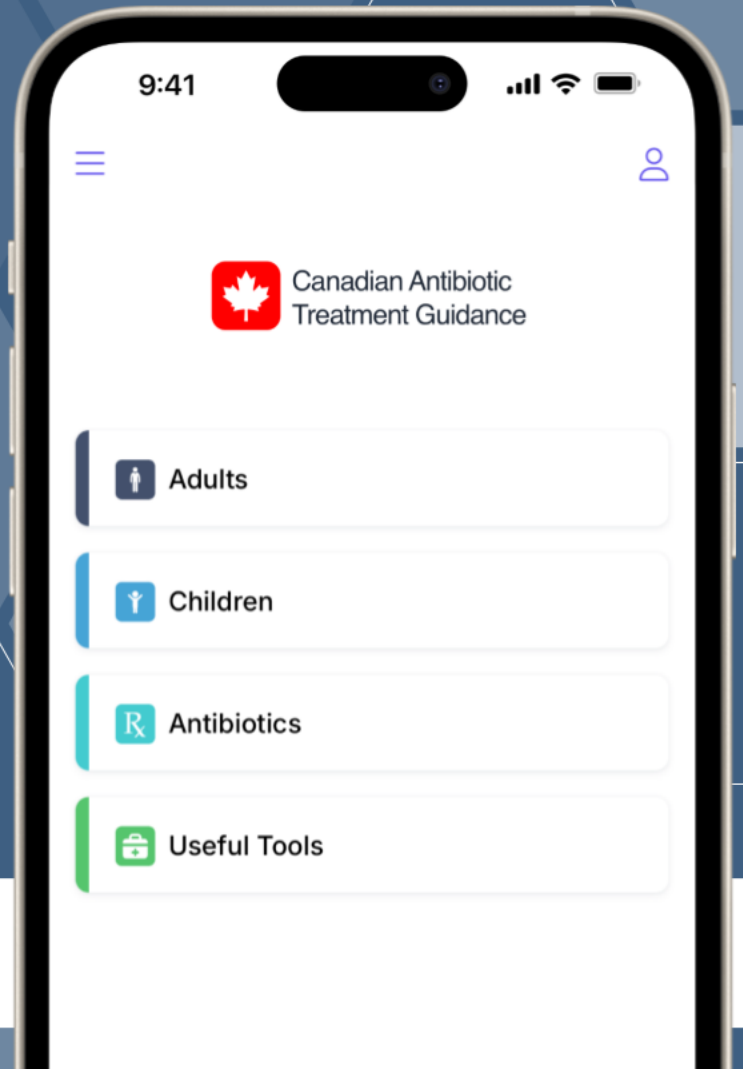
- Released in November 2025
- Guidance for adult and pediatric patients
- Outpatient focus
- Antibiotic information
- Penicillin allergy assessment tool
- Choosing Wisely Canada resources
- Health Canada resources

Communications

Canadian Antibiotic Treatment Guidance

Canadian antibiotic treatment guidance at your fingertips.

DOWNLOAD FIRSTLINE



AMMI Canada

Firstline®

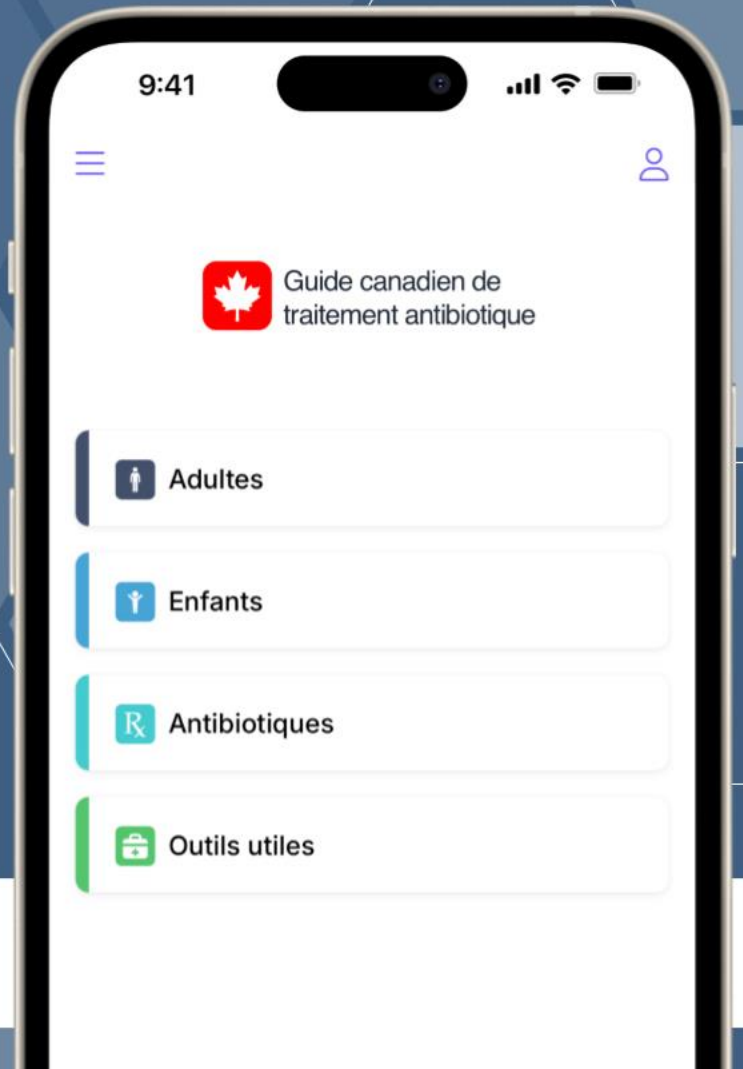
Contribution financière :
Financial contribution:

Agence de la santé publique du Canada | Public Health Agency of Canada

Guide canadien de traitement antibiotique

Guide canadien de traitement antibiotique à portée de main.

TÉLÉCHARGEZ FIRSTLINE



AMMI Canada

Firstline

Contribution financière :
Financial contribution:

Agence de la santé publique du Canada | Public Health Agency of Canada

What’s Next

More Guidelines

- Impetigo
- Erysipelas and Cellulitis
- Diabetic Foot Infections
- Urinary Tract Infections
- Stay up to date with notifications

Feedback

- We would love to hear from you!

AMMI Canada

Canadian Antibiotic Treatment Guidance

Adults | Children | Antibiotics | Useful Tools

Guide canadien de traitement antibiotique

Adultes | Enfants | Antibiotiques | Outils utiles

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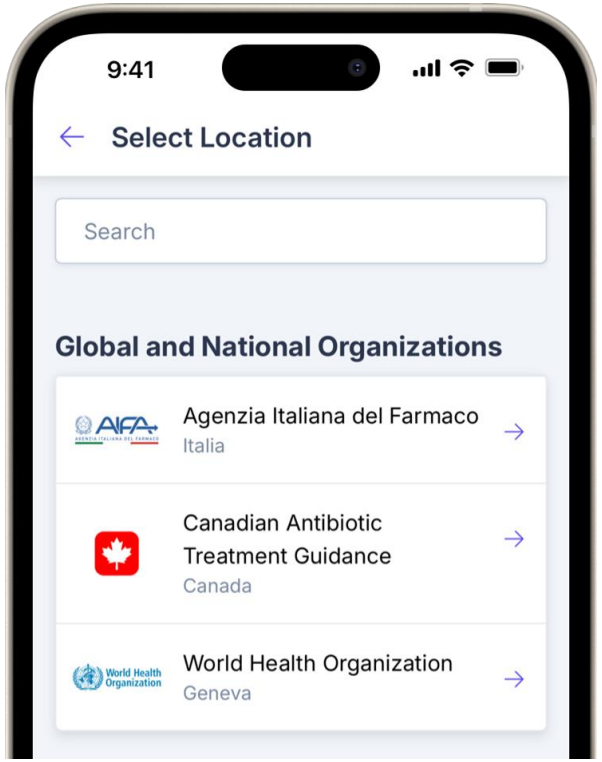


Scan the QR Code to Download Firstline

Download on the App Store

GET IT ON Google Play

1. Open Firstline app
2. Tap "Select Location"
3. Select "Canadian Antibiotic Treatment Guidance"
4. Select Language

Case 1

14 yo male has sore throat and fever > 38 °for 3 days. On examination he has exudate on both tonsils and tender cervical lymphadenopathy.

Question

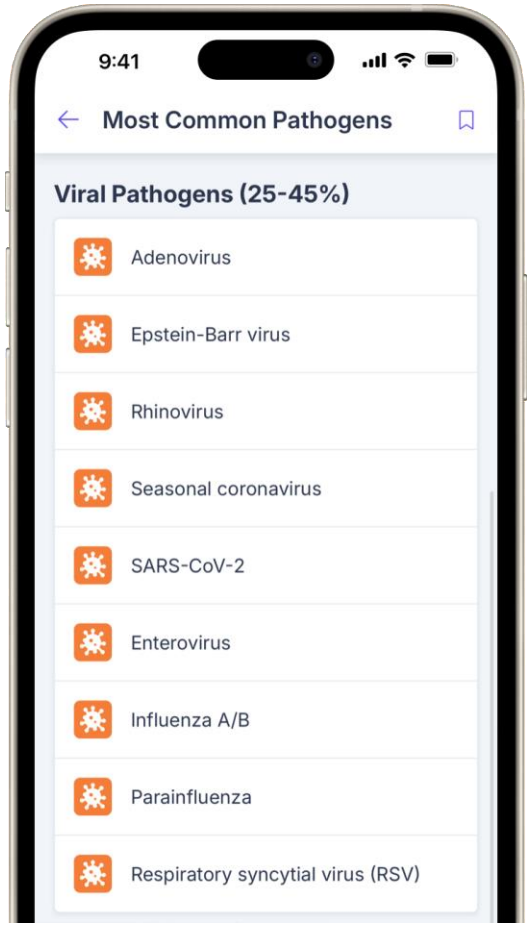
Which antibiotic and duration of treatment would you recommend:

1) Penicillin V for 10 days
2) Amoxillin for 10 days
3) Amoxillin for 5 days
4) Clindamycin for 5 days
4) No antibiotics. Watchful waiting

Case 1

Pharyngitis:

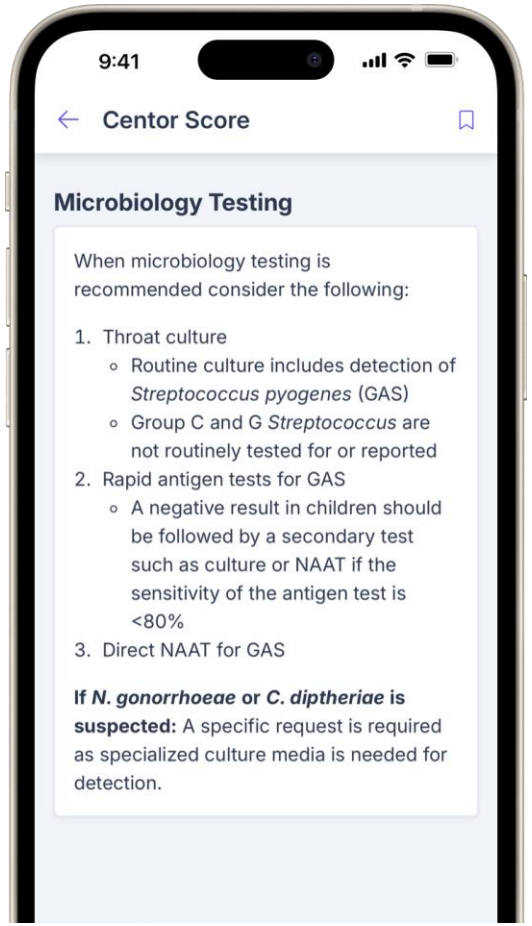
Most Common Pathogens



Case 1

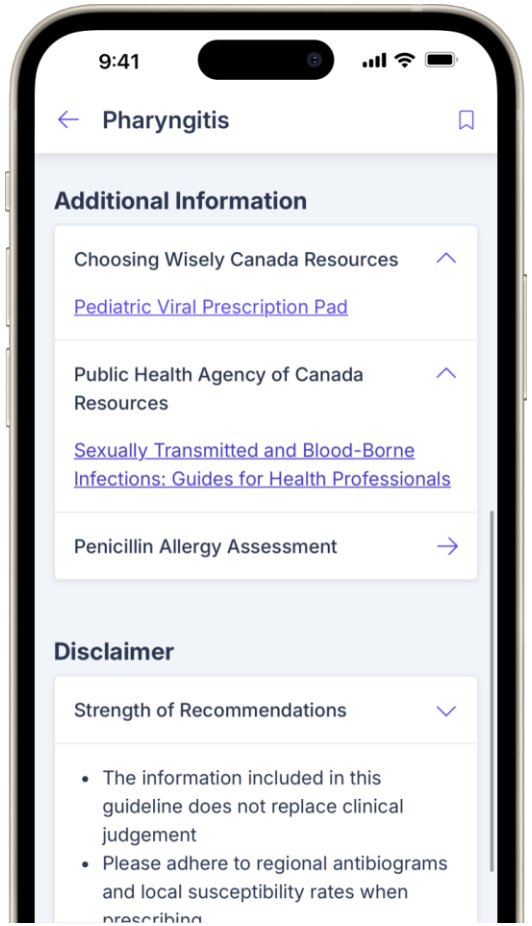
Clinical Considerations

- Clinicians can use the Modified Centor clinical scoring system to identify patients at higher risk of Group A Streptococcal (GAS) pharyngitis who may benefit from such testing.
- Consistent with Choosing Wisely, clinicians can test patients with Modified Centor scores of 2 or greater.
- Clinicians should avoid indiscriminate testing for Group A *Streptococcus*, which can result in false positives and unnecessary antibiotic therapy. Colonization with GAS can occur in asymptomatic and non-infectious carriers.



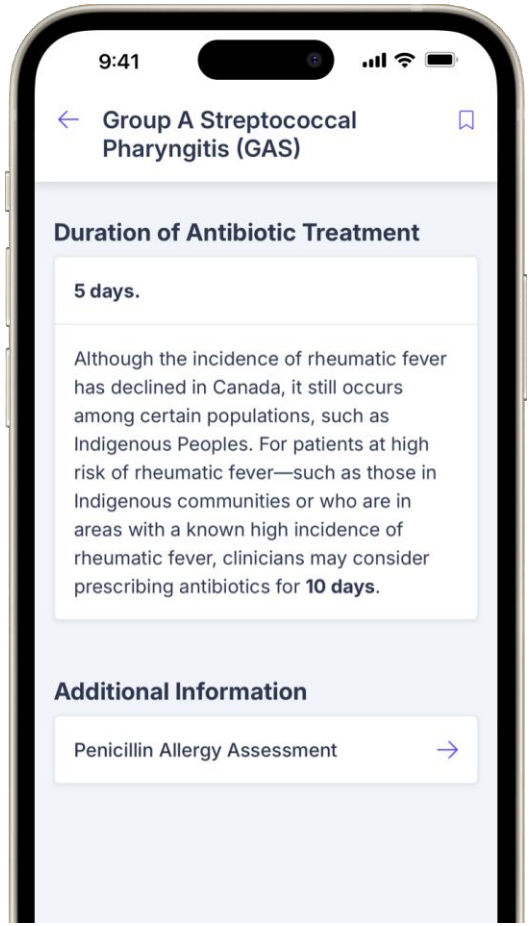
Case 1

Pharyngitis Other than Group A *Streptococcus*



Case 1

Group A Streptococcal Pharyngitis (GAS)

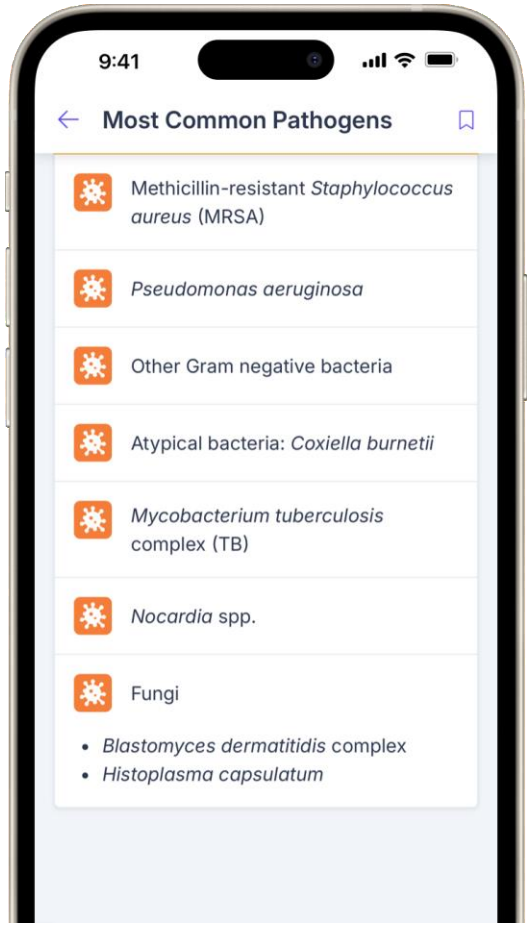


Case 2

A 60 year old women has a 1 week history of productive cough, myalgia and malaise. She has a past medical history of asthma. No recent antibiotics. She works as an elementary school teacher. She has a history of penicillin allergy over 50 years ago with a rash. On examination she has a T38.2°C, BP 120/80, HR of 80, RR 20. She has crackles in her left base.

Case 2

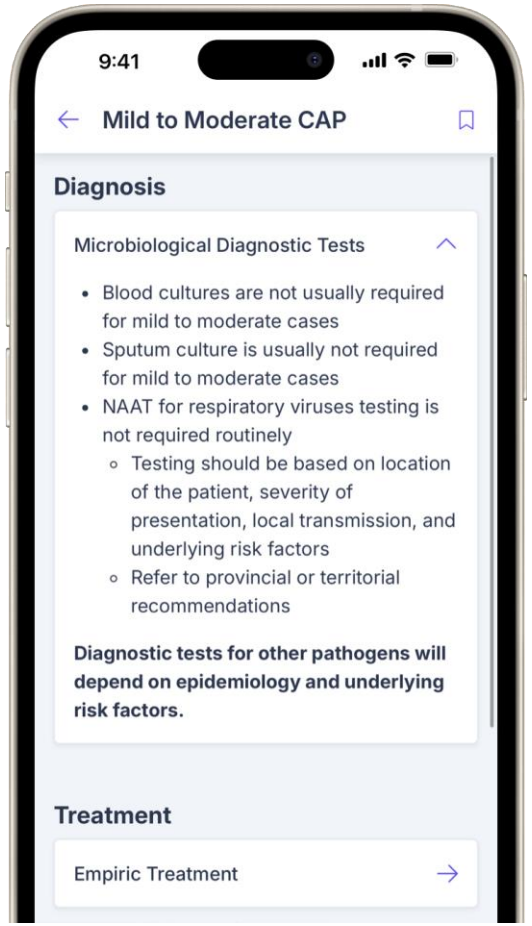
Community Acquired Pneumonia: Most Common Pathogens



Case 2

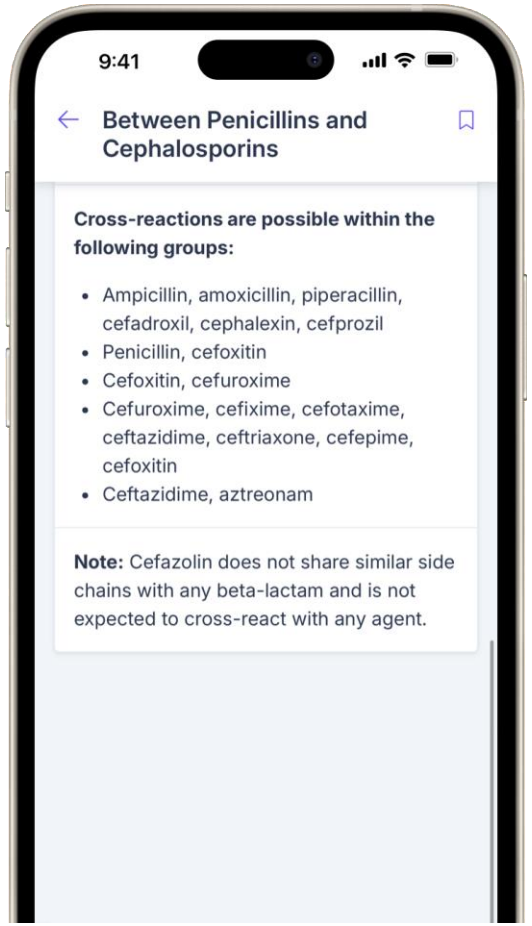
Our patient recap:

- 60 year old woman
- 1 week history of productive cough, myalgia and malaise
- PMHx: Asthma.
- No recent antibiotics.
- History of penicillin allergy over 50 years ago with a rash
- T38.2°C, BP 120/80, HR of 80, RR 20
- Crackles in her left base



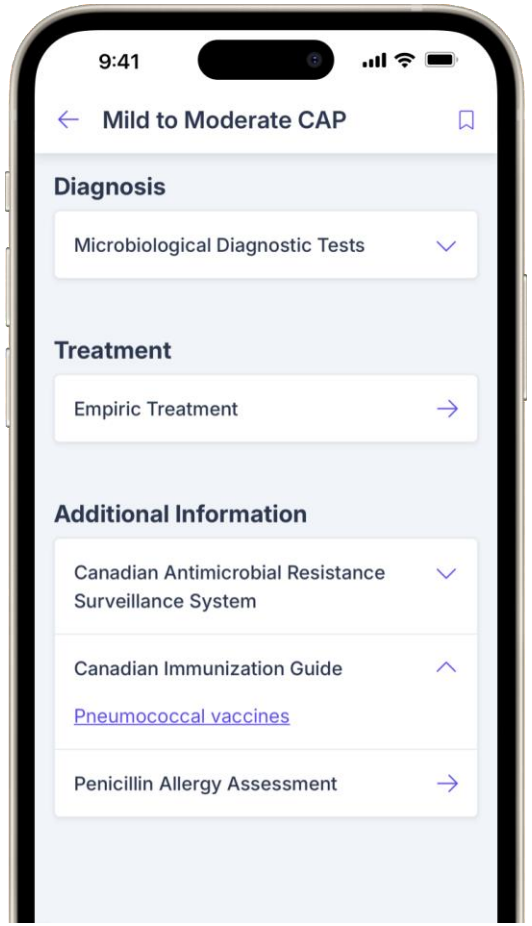
Case 2

Penicillin Allergy Assessment



Case 2

Mild to Moderate CAP: Empiric Treatment



Case 2

AMMI Canada

Government of Canada | Gouvernement du Canada

Search Canada.ca

MENU

Canada.ca > Health > Vaccines and immunization > Canadian Immunization Guide > Canadian Immunization Guide: Part 4. Immunizing agents

Pneumococcal vaccines: Canadian Immunization Guide

For health professionals

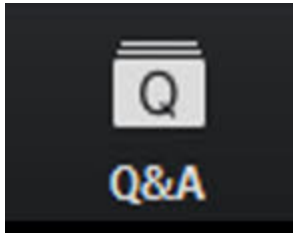
- Chronic lung disease (particularly chronic obstructive pulmonary disease, emphysema, bronchiectasis, interstitial lung fibrosis, cystic fibrosis), including asthma requiring medical care in the preceding 12 months

Adults with medical, social, behavioral or environmental IPD risk factors (18 years of age and older)

Regardless of their pneumococcal vaccination history with Pneu-C-13, Pneu-C-15 or Pneu-P-23, one dose of Pneu-C-20 or Pneu-C-21 is recommended for adults with IPD risk factors (Table 1). The recommended interval between Pneu-P-23 and

Questions and Answer Period

If you have not already done so, please enter your questions in the Q&A box and indicate, if possible, to whom your question is addressed.



We will answer as many questions as time allows.

AMMI Canada

Association of Medical Microbiology and Infectious Disease Canada

l'Association pour la microbiologie médicale et l'infectiologie Canada

Thank You for Attending

From Evidence to Action: Launch of the Canadian Antibiotic Treatment Guidance